L. P.

Driveway, Brandon Experimental Farm.

16—1916

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

Canada. Agriculture, Dept. of.

EXPERIMENTAL FARMS

REPORTS FROM THE

DIRECTOR
DIVISION OF CHEMISTRY
DIVISION OF FIELD HUSBANDRY
DIVISION OF ANIMAL HUSBANDRY

FOR THE YEAR ENDING MARCH 31, 1915.

1914/15, Vol. 1.

PRINTED BY ORDER OF PARLIAMENT.

OTTAWA
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EXCELLENT MAJESTY
1915

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, March 31, 1915.

SIR,—I have the honour to submit, for your approval, the twenty-eighth annual report of the work carried on at the several Dominion Experimental Farms and Stations.

It was found necessary last year, for the first time, to bring out this report in two volumes, owing to the larger number of farms reported on and the greater amount of experimental work carried on at each.

The division of the whole into Sections A and B has been maintained, the experience of another year having accentuated the approval with which this arrangement was first received.

Section A contains my report as Director, and a summary of the year's results in the various Divisions on the Central Experimental Farm and on the branch Experimental Farms, Stations, and Substations. For the preparation of these divisional and branch farm notes, I am indebted to the chief officers of the divisions here and to the superintendents of the branches.

Section B contains detailed reports on the various lines of experimental work under way throughout the Dominion Experimental Farms system during the year. These have been prepared by the Dominion officers having supervision of such work on the Central and branch farms, in collaboration with the superintendents of the latter.

These detailed reports fall under the heads of Animal Husbandry, Bee-keeping, Botany, Cereal Breeding and Variety Testing, Chemistry, Field Husbandry, Forage Crops, Horticulture (including Vegetable Gardening and Flowers), Poultry Husbandry, and Tobacco Husbandry.

Section A, which provides a concise, yet comprehensive, account of the work, is designed especially for those desirous of obtaining general information as to what is being done on the Experimental Farms system.

Section B is intended more immediately to aid the farmer in the various details of his work.

I have the honour to be, sir,

Your obedient servant,

J. H. GRISDALE,

Director, Dominion Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

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ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1915.

REPORT OF THE DIRECTOR

J. H. GRISDALE, B.Agr.

FIELD CROP AND LIVE STOCK NOTES FOR 1914.

The area under field crops in the Dominion in 1914 is estimated to have been 35,102,175 acres, as compared with 35,375,430 acres in 1913, a decrease of 273,255 acres. Drought is estimated to have caused a crop failure in 1914 over 1,665,500 acres, so that the total decrease in productive area, in 1914, was some 1,938,755 acres.

On the other hand, the total value of the field crops produced in the two years 1913 and 1914, is estimated at $552,771,500 for the former and $638,580,300 for the latter, an increase of $85,808,800. This increase is chiefly to be attributed to higher prices since the outbreak of the war. A comparison of the figures in the following tables will show this marked rise in price quite clearly.

While the quality of the grain in 1914 was not equal to that of 1913, it may be classed as fair.

A comparison of the numbers of farm live stock for the years 1910-14, inclusive, as given in table III, will show that there has been no marked increase in any class in 1914, and in some cases a decrease is recorded.

TABLE I.—Comparison of Yields and Prices Obtained for the Years 1913 and 1914.

Crop.	Average Yield per acre.		Average Price per bush.		Total Production.	
	1913	1914	1913	1914	1913	1914
—	bush.	bush.	$	$	bush.	bush.
Fall wheat	23·29	21·41	·80	1·05	22,592,000	20,837,000
Spring wheat	20·81	15·07	·66	1·24	209,125,000	140,443,000
All wheat	21·04	15·67	·67	1·22	231,717,000	161,280,000
Oats	38·78	31·12	·32	·48	404,669,000	313,078,000
Barley	29·96	24·21	·42	·60	48,319,000	36,201,000
Rye	19·28	18·12	·66	·83	2,300,000	2,016,800
Peas	18·05	17·64	1·11	1·46	3,951,800	3,362,500
Beans	17·19	18·20	1·88	2·31	800,900	797,500
Buckwheat	21·99	24·34	·64	·72	8,372,000	8,626,000
Mixed grain	33·33	35·36	·55	·66	15,792,000	16,382,500
Flax	11·30	6·62	·97	1·03	17,539,000	7,175,200
Corn for husking	60·30	54·39	·64	·71	16,772,600	13,924,000
Potatoes	165·88	180·02	·49	·49	78,544,000	85,672,000
Turnips, etc	358·30	394·30	·28	·27	66,788·000	69,003,000
	tons.	tons.	per ton.	per ton.	tons.	tons.
Hay and clover	1·33	1·28	11·48	14·23	10,859,000	10,259,000
Fodder corn	8·62	10·25	4·78	4·91	2,616,300	3,251,800
Sugar beets	8·71	8·98	6·12	5·99	148,000	108,600
Alfalfa	2·54	2·42	11·85	14·17	237,770	218,830

TABLE II.—Comparison of Eastern Canada, Prairie Provinces, and British Columbia as to Yields and Prices Obtained.

Crop.	Eastern Provinces.				Prairie Provinces.				British Columbia.			
	Aver. Yield per acre.		Aver. Price obtained.		Aver. Yield per acre.		Aver. Price obtained.		Aver. Yield per acre.		Aver. Price obtained.	
	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914	1913	1914
	bush.	bush	$	$	bush.	bush.	$	$	bush.	bush.	$	$
Fall wheat	23·91	21·51	·85	1·08	21·00	21·11	·62	·94	33·14	31·82	1·01	1·22
Spring wheat	19·39	19·70	1·10	1·16	19·35	14·94	·64	1·25	26·67	27·77	·99	1·23
Oats	35·00	43·57	·52	·52	43·07	28·16	·25	·44	55·50	55·93	·58	·62
Barley	29·32	29·7	·67	·69	30·30	20·87	·32	·52	35·25	37·29	·68	·92
Peas	18·00	16·21	1·16	1·46	17·22	17·23	·84	1·47	26·67	30·00	1·50	1·45
Rye	18·16	17·21	·72	·87	23·62	2·12	·48	·76	......	......	......	
Flax	22·18	15·37	1·42	1·72	11·24	6·57	·98	1·02	......	......	......	
Potatoes	162·00	191·00	·49	·42	170·00	13·01	·40	·82	207·30	182·00	·66	·78
Turnips, etc	287·48	377·29	·24	·28	252·22	25·39	·48	·65	584·35	431·00	·60	·53
	tons.	tons.			tons.	tons.			tons.	tons.		
Hay and clover	1·30	1·25	11·51	14·57	1·59	1·53	8·44	8·28	2·11	2·23	17·00	15·54
Sugar beets	9·23	9·00	5·20	6·00	5·00	6·00	5·00	5·00	......	......	......	
Fodder corn	8·65	10·53	4·66	4·84	3·69	2·32	8·47	7·16	7·66	8·00	12·00	6·00
Alfalfa	2·31	2·25	11·90	14·97	2·51	2·59	9·54	12·15	4·60	3·33	14·66	13·60

TABLE III.—Farm Live Stock, 1910-14.

—	1910	1911	1912	1913	1914
Eastern Provinces—					
Horses	1,341,065	1,343,570	1,335,628	1,436,207	1,441,381
Milch cows	2,426,280	2,076,056	2,079,188	2,188,824	2,097,586
Other cattle	2,577,867	2,509,622	2,410,671	2,479,406	1,904,976
Sheep	2,253,777	1,850,900	1,750,994	1,747,108	1,630,714
Swine	2,342,304	2,864,603	2,638,410	2,491,564	2,357,128
Western Provinces—					
Horses	872,134	1,194,927	1,296,994	1,369,283	1,445,652
Milch cows	417,671	484,170	491,289	516,011	539,998
Other cattle	1,673,096	1,324,405	1,315,681	1,336,098	1,359,464
Sheep	344,693	285,130	290,685	336,423	382,331
Swine	411,660	712,221	806,415	922,221	1,038,102
British Columbia—					
Horses	....	57,415	59,735	60,518	60,705
Milch cows	....	33,953	34,011	35,599	35,702
Other cattle	....	105,230	101,021	100,183	99,091
Sheep	....	39,272	40,702	45,000	45,000
Swine	....	33,604	32,485	34,541	39,031

NOTE.—Figures for 1910 from British Columbia not available.

METEOROLOGICAL RECORDS AT OTTAWA.

TABLE OF METEOROLOGICAL OBSERVATIONS taken at the Central Experimental Farm, Ottawa, from April 1, 1914, to March 31, 1915, giving maximum and mean temperature for each month, with date of occurrence; also the rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		In.	In.	In.		In.	
April..........	48·01	29·48	18·52	38·74	70·0	19th....	13·0	13th....	2·04	4·00	2·47	19	0·77	26th.
May..........	73·65	45·35	28·30	59·50	92·8	27th....	31·0	1st......	0·30	......	0·30	7	0·16	30th.
June..........	75·23	51·04	24·18	63·13	91·0	24th....	38·0	20th....	2·21	......	2·21	9	0·65	24th.
July..........	80·70	56·81	23·89	68·75	92·0	17th....	44·2	22nd....	1·41	......	1·41	12	0·54	23rd.
August........	77·50	53·61	23·89	65·55	90·0	10th....	41·0	26th....	2·38	......	2·38	11	0·60	2nd.
September....	69·81	46·42	23·38	58·11	92·0	22nd....	30·0	29th....	2·09	......	2·09	11	0·61	2nd.
October......	58·30	40·06	18·23	49·17	77·0	4th....	22·0	27th....	1·85	s	1·85	12	0·46	10th.
November....	37·52	23·07	14·45	30·29	64·6	1st.....	— 2·2	18th....	1·70	17·75	3·50	13	1·18	16th.
December.....	24·76	9·00	15·76	16·88	45·6	3rd....	—25·0	26th....	0·66	18·00	2·46	12	0·80	14th.
January.......	22·76	6·80	15·96	14·78	40·0	7th....	—25·4	30th....	0·97	21·50	3·12	14	0·70	25th.
February......	26·95	11·78	15·17	19·36	40·0	15th....	—10·5	4th....	0·69	15·25	2·21	13	0·40	3rd.
March.........	34·40	17·79	16·60	25·99	45·6	24th....	3·0	3rd....	0·47	2·00	0·67	9	0·23	21st.
	.....	.....	.....	.....	....	....	......	....	16·77	78·50	24·67	142	....	

Rain or snow fell on 142 days during the twelve months.
Heaviest rainfall in 24 hours, 1·18 inches on November 16.
Heaviest snowfall in 24 hours, 8·00 inches on December 14.
Highest temperature during the twelve months was 92·8° on May 27.
The lowest temperature during the twelve months was —25·4° on January 30.
During the growing season rain fell on nineteen days in April, seven days in May, nine days in June, twelve days in July, eleven days in August, and eleven days in September.
May shows the lowest numbers of days with precipitation, viz., seven.
Total precipitation during the twelve months, 24·67 inches, as compared with 28·51 inches during 1913-14.

Rainfall, Snowfall, and Total Precipitation from 1890 to 1914; also, the average annual amount that has fallen.

Years.	Rainfall.	Snowfall.	Total Precipitation.
	Inches.	Inches.	Inches.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·72
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25 95	108·75	36·79
1905	23·71	87·25	32·42
1906, January 1 to March 31	1·90	24·50	4·34
1906–07	21·73	72·50	28·94
1907–08	24·70	134·75	38·18
1908–09	22·13	107·90	32·91
1909–10	28·40	61·25	34·51
1910–11	18·94	88·25	27·72
1911–12	20·12	98·50	29·95
1912–13	32·54	106·50	43·18
1913–14	21·51	70·25	28·51
1914–15	16·77	78·50	24·67
Total for 25 years and 3 months	634·33	2,284·00	862·99
Average for 25 years	25·37	91·36	34·51

Record of Sunshine at the Central Experimental Farm, Ottawa, from April 1, 1914, to March 31, 1915.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April	24	6	181·0	6·03
May	31	0	275·1	8·87
June	26	4	270·2	9·00
July	30	1	295·7	9·53
August	29	2	233·7	7·53
September	28	2	224·8	7·49
October	22	9	143·5	4·62
November	19	11	76·6	2·55
December	18	13	91·5	2·95
January	23	8	87·1	2·80
February	19	9	100·3	3·54
March	30	1	211·5	6·82

WILLIAM T. ELLIS,

Observer.

PUBLICITY.

Since the inauguration of the Dominion Experimental Farms in 1886, with a Central Farm as headquarters at Ottawa and four branch Farms—one in each of the provinces of Nova Scotia, Manitoba, Northwest Territories, and British Columbia—the Farms system has expanded until to-day there are twenty-nine Experimental Farms, Stations, and Substations established throughout the Dominion, where systematic experimental and research work is being conducted by specially trained investigators seeking to solve the innumerable problems which underlie successful farm operations. These Farms and Stations are equipped and maintained for the special benefit of the farmers of Canada, and our aim is to place before these farmers in a practical and understandable manner the results of our experiments and investigations.

In no small measure we have assisted in the extraordinary development which has taken place in Canadian agriculture during the past quarter of a century; but, helpful as we have been, we realize that the objects for which the Dominion Experimental Farms were incepted will not have been fully attained until every one of the 765,000 farmers of this country has a knowledge of our institutions, of the work we are doing, and is directly or indirectly benefiting by our experience.

By short courses, lectures, correspondence, reports and bulletins, and through the agricultural press we are imparting a vast amount of valuable information; but, from lack of the necessary facilities and machinery, that information is not as widely disseminated as we should wish; nor are we able to get in touch with a very large number of the men who more particularly need our assistance. There are many thousands of farmers throughout the Dominion, especially in the more recently settled sections, who are not receiving directly or regularly our publications; who do not know of the existence of the Farms System, and that these bureaus of agricultural information are available to them for advice and suggestions when confronted with problems which they themselves are unable to solve.

For these reasons, the question of greater publicity concerning the Experimental Farms has been receiving our earnest consideration for some time past, with the result that early in the spring of 1914 provision was made for taking definite action in the matter. Of the several schemes contemplated it appeared to us that, with the facilities available, an organized plan of attending the principal exhibitions and fairs throughout the Dominion would, for the first year at all events, be the most economical and fruitful of results, since we could by a representative and practical exhibit: (1) impart considerable information to the many thousands of visitors to the fairs; (2) we could make known the fact that there was an extensive system of Dominion Experimental Farms with stations in every province of the Dominion; and (3) attention could be directed to our mailing list and to the large number of publications available for distribution on application.

EXHIBITIONS ATTENDED.

Under my supervision, Mr. J. F. Watson, of the Experimental Farms staff, was given charge of the work of bringing together representative exhibits from the various Divisions of the Central Farm, and the carrying out of the programme of attending the principal exhibitions and fairs to be held during 1914 throughout the Dominion.

The plan of organization adopted provided for assembling at the Central Farm the staging and exhibits for five circuits of fairs, each circuit being arranged so as to permit of attending as many fairs as possible. In accordance with this plan a "Dominion Experimental Farms' Exhibit," including an exhibit from the branch Farm nearest to the place of exhibition, and an exhibit from each of the Divisions of the Central Farm, representing Animal Husbandry, Field Husbandry, Cereals, Chemistry, Horticulture, Botany, Poultry, Bees, Forage Crops, and Tobacco, was shown at the following exhibitions: Shubenacadie, N.S.; Sydney, N.S.; St. John, N.B.;

Charlottetown, P.E.I.; Quebec, Que.; Three Rivers, Que.; Sherbrooke, Que.; London, Ont.; Ottawa, Ont.; Winnipeg, Man.; Brandon, Man; Regina, Sask.; Prince Albert, Sask.; Saskatoon, Sask.; Calgary, Alta.; Lethbridge, Alta.; Medicine Hat, Alta.; Vancouver, B.C.

With the co-operation of the superintendents of the branch Farms and Stations who, with their assistants, attended the exhibitions in their respective localities, we were able in an attractive and practical manner to place before some hundreds of thousands of visitors to the fairs some of the results of our work; while our superintendents and their assistants furnished information regarding the exhibits tabled, and by discussions and answering questions gave much useful advice concerning all lines of farm activity. As a direct result over four thousand applications were received from persons desirous of having their names placed on our mailing list.

At the close of the exhibition season we received many very satisfactory and complimentary reports from exhibition managers and visitors to the fairs and from our own superintendents and from special inquiries which we made regarding the usefulness of our exhibits. Those reports clearly indicated that, as was expected, attendance at exhibitions is one of the very best means towards the end of greater publicity concerning our institutions and of translating the results we are obtaining in the field and in the laboratory. We hope to continue this line of educational work on a more extended scale next year, and to endeavour especially to make the Dominion Experimental Farms exhibit one of the main features at a large number of the smaller fairs throughout the Dominion, as by including the smaller fairs many thousands of the farming community who do not visit the larger and principal exhibitions would be given an opportunity of making use of the institutions equipped and operated for their express benefit.

ILLUSTRATION STATIONS.

In October, 1914, accompanied by Mr. Angus Mackay, of Indian Head, Sask., for part of the time, and later by Mr. W. H. Fairfield, Lethbridge, Alta., I visited many points in that tract of country extending from Herbert, Sask., on the east to Pincher Creek, Alta., on the west, and from the international boundary on the south to Empress, Alta., on the north. This examination by rail, automobile, and horse was made with a view to the establishment of Illustration Stations at various points in the area mentioned, which, it will be observed, includes those districts more seriously affected by drought that year.

It was decided, after this trip, to carry on illustration work at the following points: Herbert, Cabri, Prelate, Gull Lake, Pambrun, Shaunavon, and Assiniboia in Saskatchewan, and Whitla, Medicine Hat, Carmangay, McLeod, Manyberries, Bow Island, Empress, Carlstadt, and Irvine in Alberta. Farms were selected at practically all these places, and subsequently a scheme of illustration work was prepared and submitted to the owners or operators of the land selected, with proposals as to the conditions under which the Experimental Farms branch was ready to carry on illustration work on their farms, or at least on certain definitely described parts thereof.

The object or purpose of this Illustration Station work probably cannot be better explained than by quoting from a memorandum prepared by myself three years or more ago and then only after the matter had been under consideration for several years. The memorandum referred to, bears date January, 1912, and in part reads as follows:—

> "For twenty-five years the Dominion Experimental Farms have been investigating problems in soil cultivation and crop production, and making varietal tests of forage crops and cereals. In that time a great deal of information of value to the farming community in connection with rotations, methods of crop cultivation, the relative values of crops to the average farmer, and the importance of performing different cultural operations at the right time has

been gained. The dissemination of this information amongst our farmers has always been a difficult problem. Many thousands of reports and bulletins are sent out every year, and farmers have been invited to correspond with us and attend agricultural meetings. Still, much remains to be done—in fact, comparatively little has been done so far as reaching the average farmer is concerned, since the average farmer, to a certain extent, and the poor farmer very positively, does not take any interest in publications, and seldom attends agricultural meetings, and so remains in ignorance of the progress that is being made in agricultural science and investigation.

"These conditions have been attracting my attention for some years, and I have been devoting attention to the matter of evolving a plan whereby our poor farmers as well as our good farmers would have an opportunity, and in a certain measure even be compelled to take advantage of or at least to observe the benefits resulting from the introduction of more advanced methods of rotation, cultivation, and crop production generally. With this end in view, I have, during the last year or two, been considering the advisability of proposing and advocating the establishment of a number of Demonstration Farms at certain points in the different provinces of the Dominion, and I now have to propose the following scheme.

"In my opinion, it would be advisable to secure the co-operation of certain farmers at or near the points named below to carry on certain work in crop rotation, soil cultivation, and soil improvement along lines to be laid down by some officer under our direction. At each of these points, I would suggest securing the co-operation of a farmer whose land should be located on some leading or well travelled road within easy walking distance of a central town or village. The farmer chosen should be one of good repute in the neighbourhood, being already recognized as a good farmer, although not necessarily the possessor of a good farm. We would ask this farmer to hand over to us, or at least to handle according to our instructions, from 15 to 30 acres of his land; that is, as many 5-acre fields as there would be years in the rotation we thought it advisable to introduce or follow in the district where the farm was situated."

As indicated above, it is planned by these Illustration Stations to arouse interest in two ways: First by giving ocular demonstrations that (1) the use of good seed, (2) following a suitable rotation, and (3) practising good cultivation, pay; and, second, by working up a feeling of friendly rivalry. By these means it is hoped that many farmers of the locality may be induced to go and do likewise.

The rapid increase in the number of our Experimental Farms and Stations during 1912 and 1913, however, and the many new lines of experiment being got under way on each, presented such an array of administrative and technical problems, and called for such heavy outlay that it was thought unwise to take up the Illustration Station work until our several new Experimental Stations were in fair running order.

It was finally decided to amplify the work suggested in the above memorandum to the extent of including illustration work with a few of the best varieties of grain and some grasses, clovers, alfalfas, corn, and roots, as well as in crop rotation and cultural methods as first intended. It will be observed, too, that the original memorandum spoke of these Illustration Stations as "Demonstration Farms." When it was finally possible to begin the work it was found that certain Provincial Governments had already made a start along somewhat similar lines and were calling the land whereon they were doing their work "Demonstration Farms," hence, to avoid confusion, it was thought advisable to designate the areas under the Dominion Experimental Farms as "Dominion Illustration Stations," and as such are they now known.

An officer well fitted to have supervision of these Stations was selected, viz., Mr. John Fixter, farm foreman on the Central Experimental Farm, Ottawa, for some twenty years, subsequently farm manager at Macdonald College, Que., and latterly chief inspector for the Commission of Conservation. Mr. Fixter's long and practical experience in crop production fits him peculiarly well for this work of supervision, and it is felt that, under his immediate control, these Stations cannot fail to be of very material benefit to the farmers in their near neighbourhood, as well as of very great service to Canadian agriculture in a general way by increasing the common fund of knowledge along the lines mentioned.

Mr. Fixter re-entered our service early in March, and proceeded immediately to the getting of things under way at the points above named and at certain other points enumerated below.

Since in the area above mentioned the great problem has usually been moisture conservation, much attention is being paid to illustration of methods of overcoming this difficulty, and the following diagram indicates the work now under way at the points below mentioned and under the charge of the farmers named therewith.

CROPPING System on Illustration Area.

Fields (5 acres each).	Year. 1915.	1916.	1917.
A	Wheat continuously		
B	2 yr. rotation		
	Wheat	Fallow	
C	Fallow	Wheat	
D	3 yr. rotation		
	Fallow	Wheat	Oats.
E	Wheat	Oats	Fallow.
F	Oats	Fallow	Wheat.
G	Alfalfa 2 acres in rows 36 inches apart.		
	" 1 " broadcast.		
	Western rye grass.		
	Corn 2½ acres in rows 36 inches apart.		
H	Wheat 2½ acres.		

LIST of Illustration Stations and Names of Operators.

Assiniboia, Sask	Warren, Percy J. H.
Beadle, Sask	How, J.
Bow Island, Alta	Mortensen, Martin.
Cabri, Sask	Abraham, F. W.
Carmangay, Alta	Nielson, Jos. A.
Empress, Alta	Barry, Frank.
Foremost, Alta	Frankish, T. H.
Grassy Lake, Alta	Perry, D. C. and F. N.
Gull Lake, Sask	Thomas, E. H.
Herbert, Sask	Holmes, Milton.
Jenner, Alta	Fisher, Jerry.
Macleod, Alta	Grier, R. and N.
Magrath, Alta	Meldrum, J. A.
Manyberries, Alta	Sikelson, Matti.
Maple Creek, Sask	Hammond, G. L.
Medicine Hat, Alta	Hunt, E. J.
Milk River, Alta	Kinder, Wm.
Pambrun, Sask	Applgren, Chas. W.
Pincher, Alta	Sandgren and Carlson.
Prelate, Sask	Huxtable, Wm.
Shaunavon, Sask	McLean, Neil.
Whitla, Alta	Babe, R. H.

It is intended to extend this work in the provinces where it has already been started, and similar lines of work are being planned for other provinces.

MEETINGS ATTENDED.

The many duties demanding my attention at Ottawa, and the necessarily large amount of time taken up each year in visiting the various branch Farms and Stations, prevent my attending many agricultural conferences or meetings of any kind. I found it possible, however, to take part in meetings or deliver addresses at a number of points during the past year. Among the more important meetings attended and addressed were the following: Waterloo County Farmers' Institute annual meeting at Galt, Ont.; Farmers' meeting (special), St. Jean Port Joli, Que.; Eastern Ontario Dairymen's Association meeting at Peterborough, Ont.; Patriotism and Production meetings at Kingston, Perth, Belleville, and Peterborough in Ontario; Board of Trade meeting, Lethbridge, Alta.; and Field Naturalists' Club of Ottawa at Ottawa, this last address being on the subject "Milk," and illustrated with lantern slides.

JOURNEYS.

As usual, journeys undertaken have been for the most part such as were connected with the inspection of branch Farms and Stations already under way or else for the purpose of looking into conditions with a view to the establishment of new Stations in districts where such work is not yet begun.

In April and May, 1914, I visited the Experimental Farms and Stations in the Maritime Provinces and Quebec, and in May and June inspected those situated west of the Great Lakes, as well as visited the tobacco Stations at Farnham, Que., and Harrow, Ont.

While in the West at this time I again went over the ground upon which it had for some time been a question of the establishment of a Station for the Okanagan valley, in British Columbia, and also visited a number of possible sites for a Station in southern Manitoba.

In October and November I again visited the western Farms and Stations, and on this occasion was authorized to organize an Experimental Station at Summerland on the site just mentioned as having been again inspected in June. This Station, as reported on elsewhere, is now well under way.

On the occasion of this trip to the West I visited a number of points in the south-western part of Saskatchewan and in the southern part of Alberta. Trips were undertaken along the various railroad lines in these districts in both provinces, stops being made at various points, and runs undertaken by horse or automobile out into the country adjoining the railroads or, in some cases, long automobile runs taken across country where no railroads existed. This trip, taken by direction of the Minister of Agriculture, had for its object not only the familiarizing of myself with agricultural conditions in the area mentioned, but was taken in a large measure with a view to the selection of a number of locations for the carrying on of illustration work in this region where there is a somewhat lighter average annual rainfall than in most parts of the prairie country. The results of this trip are discussed elsewhere under the heading "Illustration Stations."

In December I made a trip to Cochrane, Ont., the present northern terminus of the Toronto and Northern Ontario railway, and the principal town on the Transcontinental railway between Quebec and Winnipeg.

From Cochrane I proceeded west along the Transcontinental railway for about 75 miles, seeking a site for the location of an internment camp for alien enemies who were to be put to work clearing land to be used later for Experimental Farm purposes. A most excellent location was found where the railway crosses the Kapuskasing river, and here camps were opened up and operations begun immediately.

To the eastward of Cochrane I travelled about 150 miles, and finally fixed upon Spirit Lake as being probably the site on the line of the Transcontinental in the pro-

vince of Quebec best suited for a similar purpose. It should be stated that these trips were taken after the snow was on the ground, hence it was rather difficult to fix upon locations likely to be entirely suitable.

Another point I would like to put upon record here is this: that the selection of sites in both cases was very largely influenced, if not entirely controlled, by the fact that it was imperative to select land covered with standing timber to permit of the interned men being put to work at once. Thus, while the land at Kapuskasing is undoubtedly as good as any to be found along the line of the Transcontinental, the same cannot be said of the land at Spirit Lake, inasmuch as locations complying with the "well wooded" clause of the conditions governing the selection of a site were scarce, and in fact about the only available site near the railway fulfilling this requirement was the one selected.

The land at Spirit Lake is undoubtedly rather lower and probably more difficult to drain than might be considered desirable, but the soil is of good quality, and will, I am sure, prove fertile. In any case, it is eminently characteristic of the soils of the district.

These two sites are now being cleared and stumped, but it is not expected that much crop will be produced at either place in 1915.

In March I again visited some of the Farms on the prairies, and did some further work in connection with the Illustration Stations.

CORRESPONDENCE.

Below are tabulated the totals of the letters sent out from the various Divisions at the Central Farm and from the branch Farms and Stations. The total given for reports and bulletins mailed from the Central Farm represents only a very small proportion of the publications actually sent out. The mailing lists and most of the special applications are supplied from the Publications Branch, Department of Agriculture, Ottawa.

CENTRAL EXPERIMENTAL FARM.

Divisions.	Letters. Received.	Letters. Sent.
Director	20,471	13,784
Field Husbandry	1,428	1,205
Chemistry	3,605	2,872
Horticulture	7,586	7,979
Cereals	13,301	3,337
Botany	2,978	3,052
Animal Husbandry	4,163	5,822
Agrostology	728	1,134
Poultry	5,465	7,083
Tobacco	3,795	5,640
French correspondent	6,780	2,982
Apiary	843	844
Miscellaneous	13,191	4,315
Total	84,334	60,049

REPORTS, BULLETINS AND CIRCULARS.

Reports and bulletins mailed	7,361
Circulars	20,395

BRANCH FARMS AND STATIONS.

Farm or Station.	Letters. Received.	Letters. Sent.
Charlottetown	1,270	1,297
Fredericton	1,270	1,051
Nappan	2,571	2,671
Kentville	2,994	3,048
Ste. Anne de la Pocatière	1,094	1,074
Cap Rouge	3,383	3,580
Lennoxville	880	888
Brandon	3,888	4,006
Indian Head	14,614	14,558
Rosthern	3,181	2,873
Scott	1,988	2,093
Lethbridge	4,918	4,400
Lacombe	5,215	5,809
Agassiz	4,850	4,627
Invermere	659	433
Sidney	1,183	904
Total	53,958	53,312

The totals for the branch Farms and Stations are exclusive of reports, bulletins, and circulars sent out.

By adding the totals for the Central and branch Farms, the total number of letters received at all points is seen to be 138,292, and of those sent out, 113,361.

DISTRIBUTION OF SAMPLES.

This distribution was carried on as usual, all applications for grain samples being filled at the Central Farm. From Ottawa, 7,491 samples were sent out. The details of this distribution will be found in the report from the Division of Cereals. From the branch Farms and Stations, the following numbers of samples of potatoes were mailed:—

Charlottetown	20
Kentville	132
Fredericton	51
Nappan	294
Brandon	397
Indian Head	2,648
Rosthern	826
Scott	175
Lethbridge	1,025
Lacombe	1,347
Agassiz	485

This is a total from all Farms and Stations of 14,891 samples. Other distributions of material, more limited in scope, or of a special character, were also made, such as that of tobacco seed, some 4,000 samples of which were sent out, of inoculated soil for the growth of alfalfa, chiefly sent out from the western Experimental Farms, as well as a distribution of sweet corn, vegetable and flower seeds to applicants from Quebec, carried on from the Cap Rouge Station, and of tree seeds, etc., from the Prairie Farms.

PUBLICATIONS ISSUED.

The following publications have been issued during the year, or are in the press at its close:—

The Annual Report of the Dominion Experimental Farms for the year 1913-14.

In the Regular Series of bulletins:—

No. 78, Ventilation of Farm Buildings, by J. H. Grisdale and E. S. Archibald. Different systems of ventilation and their installation are taken up in this bulletin, and their relative merits weighed. It is based upon the results obtained from many years of experiments at the Central Farm.

No. 79, The Renovation of the Neglected Orchard, by M. B. Davis, Assistant in Horticulture. This is a very practical publication on this subject.

No. 80, Lime in Agriculture, by Frank T. Shutt, Dominion Chemist. The uses and methods of application of lime and its compounds are dealt with in a clear and practical manner.

Nos. 81, 82, 83, and 84 give a summary of the results of the season's work in cereals, horticulture, field husbandry, and forage plants, respectively.

No. 85, on Hardy Roses, their Culture in Canada, by W. T. Macoun, Dominion Horticulturist, and F. E. Buck, Assistant, is a compilation of the results of many years of experimental work in the growing of hardy roses.

In the Second Series, there were issued:—

No. 19, on The Planting and Care of Shade Trees, by F. E. Buck, Assistant in Horticulture.

No. 20, The Farmer as a Manufacturer, by A. T. Stuart, Assistant Chemist.

No. 21, on Tobacco Seed-beds, by F. Charlan, Tobacco Husbandman.

No. 22, on The Growing of Field Root, Vegetable, and Flower Seeds in Canada, by M. O. Malte and W. T. Macoun.

No. 23, on Medicinal Plants and their Cultivation in Canada, by J. Adams, Assistant Botanist.

Of Circulars, there were issued:—

No. 6, on The Regulations under the Destructive Insect and Pest Act Governing the Importation, Sale, Shipment, and Export of Potatoes, by H. T. Güssow, Dominion Botanist.

No. 7, on Potash in Agriculture, by the Dominion Chemist, Dr. Frank T. Shutt.

No. 8, Manures and Fertilizers, by Dr. Frank T. Shutt, Dominion Chemist.

No. 9, on The Control of Potato Diseases, by H. T. Güssow, Dominion Botanist.

In connection with the extension of our exhibition work referred to at greater length previously in this report, some thirty-eight exhibition circulars were brought out for distribution at the various points where exhibits were made. The following exhibition circulars were issued this year:—

No. 1. Natural Incubation.
No. 2. Artificial Incubation.
No. 3. Varieties of Grain recommended by Dominion Cerealist.
No. 4. Varieties of Grain recommended by Dominion Cerealist.
No. 5. Distribution and Sale of Seed Grain.
No. 6. The Farmers' Poultry House.
No. 7. Profitable Field Root Varieties for Ontario and adjacent Parts of Quebec.
No. 8. Profitable Field Root Varieties for the Maritime Provinces and Eastern Quebec.
No. 9. Crop Rotations for Central and Eastern Canada.
No. 10. Awnless Brome Grass *vs.* Western Rye Grass.
No. 11. Grape Growing.
No. 12. The Farm Flock.
No. 13. Brooding and Rearing of Chicks.
No. 14. Sweet Clover.
No. 15. Top Grafting.
No. 16. Hotbeds and Cold Frames.
No. 17. Protection of Fruit Trees from Mice and Rabbits, and care of Injured Trees.
No. 18. Bee-keeping in Canada.
No. 19. Tobacco Culture in Canada.
No. 20. Clean Milk.
No. 21. Profits from Dairy Cows.

No. 22. Coulommier Cheese.
No. 23. Cream Cheese and Butter.
No. 24. Seed Treatment for Smut Prevention.
No. 25. List of Publications.
No. 26. Chemistry of Agriculture, Part I.
No. 27. Chemistry of Agriculture, Part II.
No. 28. Chemistry of Agriculture, Part III.
No. 29. Duck Raising.
No. 30. Turkey Breeding.
No. 31. Goose Breeding.
No. 32. Nature's Bank.
No. 33. Feeding of Live Stock.
No. 34. The Farm Well.
No. 35. Crop Rotations for Dry Farming.
No. 36. Recommended Varieties of Grain for British Columbia.
No. 37. Recommended Varieties of Grain for Quebec and Ontario.
No. 38. Recommended Varieties of Grain for the Maritime Provinces.

In March, the first issue of a pamphlet entitled "Seasonable Hints" was brought out. As its name implies, the chief aim of this publication is to place in the farmer's hands some suggestions on the work on which he is presently engaged, and give him the benefit of the results along similar lines obtained at the Experimental Farms. It is planned to bring out further issues of the "Hints" during the coming year, at such times as its value will be greatest, and its contents most timely.

ADDITIONS TO AND CHANGES IN THE STAFF.

The European war has removed from the service of the Farms, though only temporarily it is hoped, a number of assistants at the branch and Central Farms, and also one superintendent, Mr. R. E. Everest, of the Station at Scott, Sask. In most cases, men have been appointed temporarily to fill the positions made vacant during the regular appointee's absence. In addition, the following appointments have been made on the branch Farms:—

Lionel Stevenson, B.S.A., Superintendent, Experimental Station, Sidney, B.C.

R. H. Helmer, Superintendent, Experimental Station, Summerland, B.C.

J. A. McClary, Superintendent, Experimental Station, Lennoxville, Que.

G. C. Routt, Manager, Tobacco Station, Harrow, Ont.; vice W. A. Barnet B.S.A., resigned.

W. H. Gibson, B.S.A., Superintendent, Experimental Farm, Indian Head, Sask.; vice T. J. Harrison, B.S.A., resigned.

W. H. Hicks, B.S.A., Assistant to the Superintendent, Brandon, Man.

T. F. Ritchie, B.S.A., Assistant to the Superintendent at Lennoxville, Que.

C. M. Williams, B.S.A., Assistant to the Superintendent at Nappan, N.S.

At the Central Farm:—

Geo Muir, B.S.A., Assistant to the Dominion Animal Husbandman.

G. G. Moe, B.S.A., Assistant to the Dominion Cerealist; vice R. L. Newton, B.S.A., resigned.

John Adams, M.A., Assistant Dominion Botanist.

F. L. Drayton, Assistant in Plant Pathology.

L. A. Brown, B.S.A., Assistant Chemist.

BUILDINGS.

Very little building work was done during the year, either on the Central or branch Farms, with the exception of some small items on the branch Farms, done by day labour. These are noted in the reports from those points.

CONFERENCE OF SUPERINTENDENTS.

In January last a conference lasting four days was held at Ottawa between the superintendents of the branch Farms and Stations and the officers of the Central Farm. A programme covering the subjects to be discussed was drawn up and followed. The conference did much to systematize the work at the various Farms and Stations, and to strengthen the esprit de corps of the whole staff of the Experimental Farms System.

NEW STATIONS.

MORDEN, MAN.

In January, an area of some 280 acres was purchased near Morden, in southern Manitoba, and preliminary work thereon was commenced this spring, under the supervision of Mr. Charles Boyle, as foreman-manager.

SUMMERLAND, B.C.

On the Penticton Indian reserve, at Summerland, B.C., 550 acres were taken over for Experimental Station purposes. Of this area, 275 acres are irrigable. The remaining 275 will be worked under "dry-farming" conditions

On November 8, Mr. R. H. Helmer was appointed Superintendent of the Summerland Station.

Up to March 31 of this year, 91 acres have been cleared and ploughed. A large amount of fluming and ditching has been done, and other preparations made for irrigation, and an agreement made with the municipality of Summerland for supplying water for the above purpose from the town water system.

EXPERIMENTS AT FORT VERMILION, PEACE RIVER DISTRICT, ALBERTA.

Seeding commenced on April 30 at the Station, and was general in the district during the first week in May. May and June were favourable to rapid growth although the rainfall was light. Haying commenced July 15, and the first grain (Black Mesdag oats) was cut on the 22nd. Strawberries were ripe by that date, and raspberries by the end of the month. Prelude wheat was cut July 4.

The first killing frost occurred on the night of September 7.

Some fencing was done on the Station, taking in an additional area of 3 acres.

The amount of fall work done in the Peace River district was considerably above the average, owing to the favourable weather.

The winter of 1914-15 has been a very mild one, with ample snowfall, which should provide abundant moisture for germination and early growth.

Nine varieties of wheat tested gave yields of from 63 to 44 bushels per acre; five varieties of oats from 120 to 60 bushels per acre. Four varieties of barley (six-row) gave returns of from 57 to 51 bushels per acre, and two varieties of two-row yielded 62 and 61 bushels per acre, respectively. One variety of peas tested, the Arthur, yielded 45 bushels per acre.

Five sorts of potatoes gave returns of from 441 to 210 bushels per acre. Garden vegetables such as peas, onions, carrots, asparagus, rhubarb, celery, beans, beets, parsnips, turnips, cucumbers, marrows, squash, pumpkins, cauliflower, cabbage, and tomatoes were successfully grown and were of fine quality.

Corn for ensilage, six varieties of which were tried, ran from 20 to 16 tons per acre. Field turnips (four varieties) from 20 to 15 tons; mangels (four varieties) from 36 to 20 tons; and field carrots (four varieties) from 36 to 26 tons per acre.

Timothy gave 1 ton 1,500 pounds per acre. Canary seed grass 2 tons 1,500 pounds, Western Rye grass 2½ tons, and Brome grass 2¾ tons per acre.

A good stand of several varieties of alfalfa was obtained, the yields running from 1 ton 1,050 pounds to 1,800 pounds per acre for the first cutting. The second cutting was left on the ground in each case.

METEOROLOGICAL RECORDS.

The following records of temperatures, precipitation and sunshine were tabulated by Mr. W. T. Ellis, weather observer at the Central Farm. The latter has also prepared tables comparing the Fort Vermilion records with those at Ottawa.

TABLE OF METEOROLOGICAL OBSERVATIONS taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1914, to March 31, 1915, showing maximum, minimum, and mean temperature; the highest and lowest for each month, with date of occurrence; also rainfall, snowfall, and total precipitation.

1914–15.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		In.	In.	In.		In.	
April	46·22	16·73	29·49	31·47	61·1	29th	−14·0	2nd	0·08	......	0·08	1	0·08	28th.
May	63·81	32·64	31·17	48·22	82·9	24th	20·9	4th	0·16	......	0·16	4	0·06	17th.
June	72·11	41·70	30·41	56·90	90·0	15th	29·0	10th	0·66	......	0·66	6	0·34	5th.
July	74·03	45·62	28·40	59·82	90·2	1st	35·2	30th	1·74	......	1·74	10	0·48	21st.
August	72·42	43·13	29·28	57·77	84·0	4th	31·2	23rd	1·80	......	1·80	7	0·90	7th.
September	58·16	33·00	25·16	45·58	76·0	3rd	23·1	17th	0·79	......	0·79	6	0·20	4th.
October	47·59	24·56	23·02	36·07	67·9	8th	15·2	11th	0·25	......	0·25	3	0·11	30th.
November	23·51	3·58	19·93	13·54	43·5	20th	−25·0	17th	......	8·00	0·80	5	0·30	11th.
December	−0·43	−25·84	25·40	−13·14	28·0	17th	−43·5	28th	......	0·50	0·05	1	0·05	21st.
January	3·24	−21·83	25·08	−9·29	32·5	18th	−53·0	26th	......	2·50	0·25	4	0·10	12th.
February	15·73	−15·33	31·07	0·20	27·5	23rd	−43·0	18th	......	3·50	0·35	2	0·30	16th.
March	33·21	1·25	31·96	17·23	55·0	22nd	−22·5	1st	......	8·00	0·80	6	0·25	3rd.
									5·48	22·50	7·73	55		

SOME WEATHER OBSERVATIONS taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River District, Alberta.

——	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total hours Sunshine.	Average Sunshine per day.
April.	°	°	°	In.	In.		
Ottawa	38·74	70·0	13·0	2·47	0·77	181·0	6·03
Fort Vermilion	31·47	61·1	−14·0	0·08	0·08	255·2	8·50
May.							
Ottawa	59·50	92·8	31·0	0·30	0·16	275·1	8·87
Fort Vermilion	48·22	82·9	20·9	0·16	0·06	392·3	12·65
June.							
Ottawa	63·13	91·0	38·0	2·21	0·65	270·2	9·00
Fort Vermilion	56·90	90·0	29·0	0·66	0·34	287·8	9·59
July.							
Ottawa	68·75	92·0	44·2	1·41	0·54	295·7	9·53
Fort Vermilion	59·82	90·2	35·2	1·74	0·48	335·4	10·81
August.							
Ottawa	65·55	90·0	41·0	2·38	0·60	233·7	7·53
Fort Vermilion	57·77	84·0	31·2	1·80	0·90	297·1	9·58
September.							
Ottawa	58·11	92·0	30·0	2·09	0·61	224·8	7·49
Fort Vermilion	45·58	76·0	23·1	0·79	0·20	163·7	5·45
October.							
Ottawa	49·17	77·0	22·0	1·85	0·46	143·5	4·62
Fort Vermilion	36·07	67·9	15·2	0·25	0·11	128·2	4·13
November.							
Ottawa	30·29	64·6	−2·2	3·50	1·18	76·6	2·55
Fort Vermilion	13·54	43·5	−25·0	0·80	0·30	43·9	1·46
December.							
Ottawa	16·88	45·6	−25·0	2·46	0·80	91·5	2·95
Fort Vermilion	−13·14	28·0	−43·5	0·05	0·05	60·1	1·93
January.							
Ottawa	14·78	40·0	−25·4	3·12	0·70	87·1	2·80
Fort Vermilion	−9·29	32·5	−53·0	0·25	0·10	63·9	2·06

Part of Experimental Farms Exhibit, Central Canada Exhibition, Ottawa, 1914.

SOME WEATHER OBSERVATIONS taken at Central Experimental Farm, Ottawa—*Con.*

—	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total hours Sunshine.	Average Sunshine per day.
February.	°	°	°	In.	In.		
Ottawa	19·36	40·0	−10·5	2·21	0·40	100·3	3·54
Fort Vermilion	0·20	27·5	−43·0	0·35	0·30	114·7	4·09
March.							
Ottawa	25·99	45·6	3·0	0·67	0·23	211·5	6·82
Fort Vermilion	17·23	55·0	−22·5	0·80	0·25	166·7	5·37

RECORD OF SUNSHINE at Fort Vermilion, Peace River District, Alberta, from April 1, 1914, to March 31, 1915.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April	30	0	255·2	8·50
May	31	0	392·3	12·65
June	28	2	287·8	9·59
July	28	3	335·4	10·81
August	28	3	297·1	9·58
September	23	7	163·7	5·45
October	18	13	128·2	4·13
November	13	17	43·9	1·46
December	18	13	60·1	1·93
January	23	8	63·9	2·06
February	24	4	114·7	4·09
March	25	6	166·7	5·37

WILLIAM T. ELLIS,
Observer.

EXPERIMENTS AT ST. BRUNO AND FORT RESOLUTION, NORTHWEST TERRITORIES.

ST. BRUNO.

The St. Bruno farm is situated some 20 miles west of Fort Smith. The land was first broken in 1911, four missionaries, with a small herd of cattle and a few horses, settling there.

Two fields were laid out and broken. In 1912 and 1913 the land had not yet been sufficiently worked to yield good crops, but in 1914 good returns were obtained.

Oats, barley, and wheat were grown successfully; also such vegetables as carrots, table beets, onions, lettuce, radishes, peas, and potatoes.

The original herd of eighteen head has now increased to fifty, and some 500 pounds of butter were sold during the season of 1914.

FORT RESOLUTION.

The winter of 1913-14 was severe, and the spring late, snow remaining on the ground until the third week in May. Seeding was completed by May 30, and favourable weather made germination rapid.

Growth was hastened by frequent showers during June and July. There was a slight frost on August 18, and stormy weather in September lodged the oats and barley. Harvesting took place from September 15 to 20, just in time to escape severe frost on the 22nd.

Oats (Eighty Day), barley (Manchurian), wheat (Prelude and Marquis) gave good crops. Four varieties of potatoes were grown successfully; also beans, peas cabbage, carrots, table turnips, beets, and lettuce. Many varieties of flowers bloomed freely.

EXPERIMENTS AT GROUARD, LESSER SLAVE LAKE, ALBERTA.

The wet summer and autumn of 1913 prevented fall work on the land, and when the frost was sufficiently out of the soil about April 18, special efforts were required to get the seeding done at the usual time. This was finished during the first days of May, under favourable conditions for quick growth.

Eighty Day oats were ripe on August 1, Abundance on the 14th, and Banner on the 15th. The latter yielded 45 bushels per acre. In wheats, Early Red Fife, ripe August 18, yielded 27 bushels per acre; Prelude was ripe August 20, and Marquis August 26, yielding 29¼ bushels per acre. Preston ripened the same day, and gave 28 bushels per acre. Mensury barley was ripe August 10, giving 40 bushels per acre.

In vegetables, cabbage, cauliflower, celery, tomato, squash, garden peas, beets, lettuce, onions, and carrots all did well. Many varieties of flowers bloomed profusely throughout their season.

EXPERIMENTS AT GRANDE PRAIRIE, ALBERTA.

Spring was very backward at this point, and the weather cold and dry, retarding germination, which was further injured by the fact that a large proportion of the grain had been sown on stubble owing to the bad weather of the preceding fall preventing work on the land.

Potatoes and roots were a failure for the first time in five years.

Three varieties of wheat were tested, Marquis, Prelude, and Preston. They were all grown on summer-fallow. Marquis and Preston yielded about 30 bushels per acre, and Prelude 20 bushels.

The crop of timothy ran about 1 ton to the acre. Clover was winter-killed except in small patches.

EXPERIMENTS AT SALMON ARM, B.C.

Experimental work, chiefly along horticultural lines, was continued by Mr. Thos. A. Sharpe, on his farm at Salmon Arm.

There was an unusual amount of frost in the ground during the winter of 1913-14, and the melting snows of the spring did not penetrate the soil to any depth. Spring rains were light and the summer dry, so spring grain and bush fruits were light crops, and grass and clover a practical failure.

Potatoes and roots were below average in yield.

The experimental orchard gave a medium yield.

Tests were also carried on with different varieties and strains of vegetables.

Clover and alfalfa have done well in the Salmon Arm district. They should play a large part in farming operations there which, in Mr. Sharpe's opinion, should be a combination of dairying and fruit-growing.

METEOROLOGICAL REPORT for the Year ending March 31, 1915.

—	Highest Temperature.		Lowest Temperature.		Rainfall.	Snowfall.	Sunshine.	
1914.	°	Date.	°	Date.	Inches.	Inches.	H.	M.
April	74	30	27	21	0·89	....	161	54
May	88	31	30	5	0·96	....	260	36
June	90	30	38	6	1·43	....	200	42
July	96	30	40	23	0·76	....	284	24
August	93	1	38	30	0·32	....	298	36
September	82	2	34	15	1·52	....	122	0
October	68	14	30	4	1·25	....	120	36
November	54	10	18	15	2·16	4½	28	30
December	42	4	5	19	....	12	23	12
1915.								
January	36	2, 7, 9	1	20	....	21½	40	48
February	44	20	14	13	0·20	2½	51	48
March	65	21	20	2	0·96	....	158	54
					10·54	40½	1,752	0

DIVISION OF FIELD HUSBANDRY.

The work of the Field Husbandry Division is being directed along very practical lines. Its scope may be said to include:—

1. Soil management.
2. Crop management.
3. Agricultural engineering.

Besides conducting experimental work along the lines outlined above, this division supplies grain and fodder for the up-keep of the live stock on the Farm.

The lines of work herein reported upon do not by any means cover the field naturally included in the Division for the reason that only a limited acreage of suitable land is available for experimental tests.

WEATHER CONDITIONS AND CROP YIELDS.

Seeding operations were carried on under unfavourable conditions. April was cold, which retarded seeding, while the drought of the months of May and June resulted in the uneven germination of corn and mangels. Hay made slow growth and yielded

below the average. Straw was short, but the oats filled fairly well and harvested a good yield of grain. Turnips made steady progress, while mangels and corn made remarkable autumn growth, and all yielded up to the average for the Farm. Potatoes produced a bumper crop of good quality.

COST OF PRODUCTION OF FIELD CROPS.

The following table summarizes the costs of producing mangels, corn, oats, and hay in 1914:—

Cost of Production of Field Crops, Central Farm, 1914.

Crop.	Area.	Yield Per Acre.		Cost to Produce.		
		Bushels.	Per acre.	Per ton.	Tons.	Per bush.
	Acres.			$ cts.	$ cts.	Cents.
Mangels	4	17	565	37 52	2 21	6·64
Ensilage corn	32	14·5	....	20 85	1 44	....
Oats	40	....	65	14 97	....	19.37
Oat straw	40	1·04	....	....	....	....
Hay	28·	2	....	15 75	7 87	....

ROTATION OF CROPS.

The results of experiments with crop rotations indicate the importance of the order in which crops are grown. A good rotation may be said to include hoed, grain, and hay crops which, for best results, should be grown in the order named. The duration and cultural treatment of the rotations, however, may be varied to suit different conditions. The following rotations are now in operation here, any one of which should prove satisfactory for ordinary farm conditions.

Rotation "A" (five years' duration).—Hoed crop, manured. Grain, seeded down with clovers and grass. Clover hay, top dressed with manure in autumn. Timothy hay, field ploughed in August, top worked and ribbed up in October. Grain, seeded down with red clover to be ploughed under the following spring, when the succeeding hoed crop is corn.

Rotation "B" (five years' duration).—Hoed crop, manured. Grain seeded down with clovers and grass, seeds top dressed with manure in autumn. Clover hay, ploughed in autumn. Grain seeded down with clovers and grass. Clover hay.

Rotation "C" (four years' duration).—Hoed crop, manured. Grain, seeded down with clover and grass. Clover hay, timothy hay, field ploughed in August, top worked and ribbed up in October.

Rotation "D" (three years' duration).—Hoed crop, manured. Grain, seeded down with clovers and grass. Clover hay.

Soiling Crop, Rotation "R" (three years' duration).—Corn for early fall feed, manured. Peas and oats to cut green, seeded down with clovers and grass. Clover hay, to cut green.

Some characteristics of the above rotation, desirable under almost any conditions, are as follows:—

(1) Grain fields are always seeded down with clover, even though it be used only as a fertilizer, as in the case of the fifth year of rotation "A."

(2) Grass and clover seedings are heavy. Increased crops of hay and rare failures of a catch have justified them.

(3) Hoed crops form a large proportion of every rotation. An attempt to farm a small area without a hoed crop was not successful. Weeds could not readily be kept in check.

(4) No field is left in hay for more than two years. Our records show that the second crop almost always costs more than the first per ton, and that succeeding crops are very liable to be grown at a loss.

(5) Barnyard manure is applied frequently in comparatively small quantities, rather than at long intervals in large quantities.

The following record shows the comparison of the chief items in connection with these rotations:—

Cost, Returns and Net Profits or Losses of Rotations "A," "B," "C," "D," and "R."

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profit or loss per acre, 1914.	Profit, average of 8 years 1904–11.
	$ cts.	$ cts.	$ cts.	$ cts.
A (five years' duration)	17 21	18 14	9 93	8 78
B (five years' duration)	17 13	18 63	1 50	9 03
C (four years' duration)	16 83	15 62	−1 21	8 15
D (three years' duration)	18 83	18 17	0 66	10 08
R (three years' duration)	18 76	19 49	0 73*	

*Records kept for two years only.

SHALLOW PLOUGHING AND SUBSOILING VERSUS DEEP PLOUGHING.

This experiment has been under way for eleven years. Two four-year rotations differing only in the preparation of the sod land for corn or roots as mentioned above are used but the results have not yet shown any decided advantage in favour of either method.

COMMERCIAL FERTILIZER AS A PART SUBSTITUTE FOR BARNYARD MANURE.

In 1913 there were completed five years of experiments designed to supply information concerning the relative fertilizing merits in regular farm rotation of:—

(1) No manure or fertilizer of any kind but pastured one year in four (records kept for two years only).

(2) Barnyard manure.

(3) Complete commercial fertilizer.

(4) Barnyard manure, together with commercial fertilizer. The results show a distinct advantage in barnyard manure alone over commercial fertilizer alone for this soil, but point to the possibility of combining the two to good advantage when barnyard manure is scarce or high in price.

DIVISION OF CHEMISTRY.

During the latter half of the year just closed the work of this Division has been carried forward under considerable difficulties, enlistments for active service and resignations having very seriously depleted the staff. The dislocation of the organization and the unavoidable interruption in the work, both investigational and casual,

will be appreciated when it is stated that within five months the staff has lost no less than four of the five assistant chemists upon whom, naturally, the major part of the analytical work falls.

Notwithstanding these adverse circumstances, much has been accomplished. The larger number of investigations in course for some time past have been proceeded with and some new ones, occasioned by conditions brought about by the European war, have been instituted.

As far as has been possible, the many and ever-increasing requests from farmers for analytical work and advice have been attended to, but owing to the circumstances already referred to there has resulted a large accumulation of these matters, and the Division asks for the exercise of patience on the part of its correspondents, who may rest assured that their requests will be dealt with at the earliest possible moment.

The "Patriotism and Production" campaign recently carried on throughout the Dominion has added greatly to the labours of the Division in many ways. Special articles, circulars, and bulletins have been written and issued on subjects of vital importance to a greater and more economical production of crops. The campaign also awakened a more lively interest in farming matters and resulted in a very large increase in the number of correspondents and of the samples of soils, feeding stuffs, etc., sent in for examination. Of these samples the record book of the Division shows that nearly 4,000 were received during the year—more than 1,000 over the number of the preceding year.

The investigation undertaken in 1912 to ascertain the influence of various cultural systems upon the moisture content of the soil has been continued on several of the branch Farms and Stations of Manitoba, Saskatchewan, and Alberta. Throughout the growing season, soil samples are collected on the plots under experiment with a view of determining the amount and distribution of the moisture to a depth of 6 feet. The results of the analyses should show the extent to which the soil moisture has been conserved by the several cultural operations. So far they have afforded evidence of the value of early and fairly deep ploughing on summer-fallows; of the subsurface packing of light soils and of frequent cultivation of fallows in order to check surface evaporation.

The examination of soils from districts under irrigation in Alberta has been continued, and a considerable addition to our knowledge of these areas has been gained. The more immediate objects of this work are to define the areas in which injurious alkali occurs and to ascertain the suitability of the districts in question for the carrying on of successful farming operations under irrigation. The progress of the analytical work has been much hindered by the loss of the assistants who had gained considerable skill in its conduct, but the prospects are now good for the more rapid prosecution of this wide and important investigation.

The European war entirely cut off the Canadian supply of potash compounds used in fertilizers. The sole source of these compounds for the world has been for many years the extensive mines at Stassfurt, Germany. With the view of supplying this deficiency, inquiry has been made as to our natural supplies of potash and, among several researches to that end, analyses have been made of the varieties of seaweed occurring more abundantly on the Pacific and Atlantic seaboards. Many of these seaweeds have been found rich in potash and nitrogen and evidently of great value for fertilizing purposes.

In this connection a practical trial is being made at Clark's Harbour, N.S., in the preparation of dried, ground seaweed for use as a fertilizer, and the prospects at the time of writing are good for the success of the undertaking.

The influence of environmental condition on the composition of wheat is the subject of a research commenced some years ago. It has already yielded results of national importance in showing that climatic conditions may profoundly modify the protein content of the grain, and incidentally that high temperatures accompanied by

a fairly dry soil during the filling out of the kernel—conditions characteristic of the wheat-growing areas of the Northwest—are conducive to a hard berry with a high gluten content. The scope of this work has been greatly extended and its value enhanced through the co-operation of the Meteorological Service, which has undertaken the tabulation of weather statistics at the various points throughout the Dominion at which we are conducting this experiment and the correlation of these data with the crop yields.

The experimental work with fertilizers begun two years ago at the branch Stations at Fredericton, N.B., and Kentville, N.S., has been continued. The season of 1914 has yielded results that, in the main, confirm those obtained in 1913, namely, that for potatoes on soil in fair condition as to richness and tilth, moderate dressings, say about 500 pounds, have proved the most profitable (though not necessarily giving the largest yields), and that in the larger number of trials better returns have followed the application of a mixture containing all three elements of plant food than where one or two of the elements only have been furnished. These are the two outstanding results of general application and value.

Plans have been perfected for extending the investigational work with fertilizers on systematic and scientific lines. For the past two years preparations for this have been made at five of the branch Farms and Stations by cropping, without manure or fertilizer, several series of plots. The scheme of fertilizing has been carefully thought out and made as complete as the size of the area set apart for the work would permit. It is proposed to put these plots under a four-year rotation: first year, potatoes, roots or corn; second year, grain seeded with clover and timothy; third and fourth years, hay.

The analysis of sugar beets grown on fourteen of the branch Farms during the season of 1913 has given most satisfactory results, thus furnishing further evidence of the suitability of the soil and climatic conditions in the widely distant parts of the Dominion for the production of roots rich in sugar. The varieties tested were Improved Vilmorin A and B, Très Riche, and Klein Wanzleben, the seed being obtained from Messrs. Vilmorin, Andrieux et Cie., Paris, France. This investigation dates back to 1902, so that the results are becoming increasingly valuable for those inquiring as to the possibilities of Canada as a sugar-producing country.

Among many fodders and feeding stuffs examined may be mentioned a series of field roots—mangels, turnips, and carrots—grown on the Central Farm, Ottawa. The object of this investigation, now in its ninth year, has been to ascertain as far as might be possible by analyses, the relative feeding value of the various classes of roots and of the several varieties of each class. In the mangels, more particularly, it has been found that large differences in dry-matter content exist among the varieties as commonly offered for sale.

The number of well waters examined for farmers during the year was 336. From the correspondence on the subject it is evident that an increasing interest is being taken in the matter of the home water supply, and that, speaking generally, farmers are becoming more and more alive to the desirability of a pure supply both for domestic and stock use.

The nitrogen content of the rain and snow as falling at Ottawa (Central Experimental Farm) has been determined. During this eighth year of the investigation, ending February 28, 1915, the precipitation has been below the average, but this did not reduce the amount of available nitrogen for enrichment of the soil per acre, furnished by these sources. The average for the previous seven years is 6·182 pounds, the amount for the past year, 7·897 pounds per acre.

The samples submitted for examination and report by the Meat Inspection Division, Health of Animals Branch, during the year 1914-15, numbered 662. These comprise dyestuffs, preservatives, pickling solutions, spices and condiments, evaporated apples, preserved meats, etc., collected at the various packing houses and canneries

throughout the Dominion. This important work, which is steadily on the increase, calls for a large amount of skilful and careful analytical work, necessitating in many cases the devising of special methods which can only be determined upon after considerable time spent in research.

HORTICULTURAL DIVISION.

The experimental Farms and Stations, situated as they are in many parts of Canada where both the summer and winter climates vary in a marked degree, give abundant opportunities for finding out what are the best horticultural crops and varieties to grow in Canada and how best to grow them.

WORK AT THE BRANCH FARMS AND STATIONS.

The Experimental Station at Sidney, Vancouver Island, B.C., one of the newer Stations, received considerable attention from the Horticultural Division in 1914. During that year there was no superintendent and, in order not to lose any time, plans were made at Ottawa for the plantations there, and material was ordered. As a result, some 15 acres of fruits were set out. Among the fruits being tried are apples, peaches, pears, plums, cherries, apricots, nectarines, quinces, persimmons, figs, and citrus fruits. Of nut trees, there are English walnuts, chestnuts, filberts, and almonds, and there will be others later on. Plantations of holly and cascara were also set out. Provision was made in the plans for a test of many species of ornamental trees, shrubs, and herbaceous plants, a large number of which were set out in 1914.

At the Experimental Station, Fredericton, N.B., another of the newer Stations, 11 acres of orchard were set out, consisting mainly of trees of apples, pears, plums, and cherries. These orchards are arranged both for cultural experiments and the testing of varieties. An addition of 3½ acres was made to the orchards at the Experimental Station at Ste. Anne de la Pocatière, Que., where a good start had been made the year before. At the new Station at Lennoxville, Que., the land was prepared for an orchard to be planted in 1915. A nursery was established to make provision for trees needed on the ornamental grounds when the land is ready.

At the older Farms and Stations there was considerable development in the horticultural work. Perhaps one of the most interesting experiments on the prairie Farms at present is the testing of many thousand seedling trees raised from the hardiest of the Russian apples. It is hoped to obtain from this large number some varieties of good size which will be hardy and better in quality than any of those available at present. There was a marked difference in the hardiness of individual specimens in 1914. The cross-bred apples originated by the late Dr. Wm. Saunders, though small in size, continue to show superior hardiness to any of the large varieties of apples. These have now fruited at all the prairie Farms. So far, the best crops of true apples have been obtained at the Experimental Station, Lethbridge, Alta., where a number of varieties bore in 1914 as in 1913 also.

HORTICULTURE AT THE CENTRAL FARM.

The new greenhouses recently erected for the Horticultural Division have proved very satisfactory, and a number of interesting experiments have already been tried there. The growing of greenhouse grapes in large pots is practically unknown in Canada and, to show what might be done, these were given a trial and good results were obtained. Black Hamburgh and Foster Seedling were two of the best varieties. By growing grapes in pots, persons with small greenhouses need not devote a part permanently to grapes, but may put the pots outside when the fruiting season is over and afterwards store the vines in a cellar. Tomatoes grown in 12-inch pots also gave good results. There was an excellent show of the best chrysanthemums in November. Plant-breeding work was carried on under glass. Crops of melons, cucumbers, cauliflowers, beans, and lettuce were also raised.

The fruit crop was a good one in 1914 at the Central Experimental Farm, it being clean and well grown. As fire pots for protecting crops from frost have been used successfully in the Western States, four hundred of these were purchased in 1914 for experimental work, and while the season was particularly free both from late spring and early autumn frost, some interesting results were obtained in showing that the temperature could be raised several degrees by this means.

Especial attention is being given to the breeding of new fruits, vegetables, and flowers. Early-bearing varieties of fruits, early strains of vegetables, and improvements in a few kinds of flowers were some of the lines on which this work was continued in 1914.

Experiments with ornamental plants were continued, and very useful additional information in regard to herbaceous plants was obtained. The rose garden is now a striking feature of the ornamental grounds at the Central Farm.

DIVISION OF CEREALS.

The season of 1914 was, on the whole, not very favourable for cereals. Severe drought was experienced—at one period or another—over large areas of country. Western Quebec and eastern Ontario suffered chiefly during the early part of the season, while southwestern Saskatchewan and southeastern Alberta were very seriously affected throughout the whole summer. Districts which had a fair rainfall produced excellent crops. Particularly successful were central Alberta, southwestern Ontario, and parts of the Maritime Provinces.

Cereal crops on the Experimental Farms and Stations were generally good, the methods of seed selection and soil cultivation employed being such as to reduce to a minimum the damage caused by unfavourable weather of any kind.

While the experimental work with cereals was somewhat interfered with at two or three of the Farms by the abnormal conditions, the results of the season were, on the whole, satisfactory so far as yield of grain is concerned.

NEW STATIONS.

Cereal investigations are always carried on at a great disadvantage when the land is lacking in uniformity. It is therefore usually impossible to begin successful tests of varieties during the first two or three years after the establishment of a new Station.

The soil difficulties at Cap Rouge, Que., are now clearly understood, and as the chief of these can be easily remedied (by the application of lime) it is expected that this year the test plots will give much more satisfactory results than they have hitherto done.

Suitable land has been set aside for the growing of cereals at Ste. Anne de la Pocatière, but trial plots will not be established until an efficient system of drainage has been arranged. This will probably be done during the present year.

A beginning is to be made at Fredericton this spring. While the land is as yet rather uneven for experimental work, it is believed that valuable results can be reached by the plan which is being adopted, namely, to sow four plots of each of the varieties under trial.

At Kentville, N.S., it is proposed to grow only a very small number of the best varieties, and to have a large plot or a small field of each sort.

A series of plots will be sown this spring at Invermere, B.C., on irrigated land. A small number of varieties will be tested—sufficient, however, it is believed, to serve as a guide to farmers in the Columbia valley. These plots will be in duplicate, one series receiving more water than the other.

MARQUIS WHEAT.

Marquis wheat has won its fourth successive triumph in international competitions. The latest victory was at the Dry-farming Congress at Wichita, Kansas, last autumn, when an exhibit of Marquis grown by Mr. Seager Wheeler, of Rosthern, Sask., was awarded the highest score.

Marquis now holds, almost undisputed, the first place among varieties of spring wheat in Canada. It is also highly esteemed in parts of the United States which touch the Canadian border; and it has given an excellent account of itself in Colorado, at high altitudes, where early-ripening varieties are needed.

PRELUDE AND PIONEER WHEATS.

These very early-ripening varieties, which have been before the public for only a short time, have shown themselves well adapted for some districts for which there has hitherto been no suitable sort. Prelude, by its extraordinary earliness, makes wheat growing profitable in localities where ordinary varieties are almost always damaged by frost late in August; and Pioneer, though a less useful sort, is the only very early wheat yet introduced which is at all suitable for dry districts.

OTHER GRAIN.

While the work with the other kinds of grain is unavoidably receiving less attention than is given to spring wheat, many new cross-bred and selected sorts of barley, peas, flax, and oats are under test. The best of these will be brought to the attention of the public just as soon as they have been sufficiently tested. The premature introduction of imperfectly studied varieties is being carefully avoided.

MILLING AND BAKING TESTS.

The usual extensive tests of new varieties of wheat have been carried on during the past winter. The studies of the effects of storage on flour have also been continued, and experiments have been conducted with a view to obtaining more precise information in regard to the exact conditions necessary for the production of the best kinds of bread.

DISTRIBUTION OF GRAIN AND POTATOES.

The annual free distribution of small samples of seed grain and potatoes is being conducted as usual. Owing to the very dry weather last season at some of the Farms where the seed grain was produced, the quality of part of the material for distribution is not quite so good as usual; but great care is taken to ensure that only grain of the very highest possible degree of purity is sent out.

As the experience of many years has shown that potatoes raised at Ottawa are usually inferior for seed purposes to those produced in the cooler climate of the Maritime Provinces, arrangements are being made to distribute, this year, only potatoes grown in New Brunswick. We believe that this seed will give entire satisfaction to the farmers of Ontario and Quebec.

DIVISION OF BOTANY.

After the return, towards the end of April, 1914, of the Dominion Botanist from Europe, where he attended, as the official delegate of the Dominion, the International Conference of Phytopathology held at Rome, arrangements had to be made to fill the vacancy on the staff of the Division caused through the resignation of the chief assistant, Mr. J. W. Eastham, B.Sc., who was appointed to the post of Provincial Plant Pathologist for British Columbia.

Prof. John Adams, M.A., formerly connected with the Royal College of Science, Dublin, Ireland, received the appointment as Assistant Dominion Botanist.

Mr. F. Lisle Drayton, B.S.A., a graduate in biology from the Macdonald College, was appointed Assistant in Plant Pathology and Bacteriology.

The work of this Division has steadily increased. The special attention which is being paid to the control of plant diseases and to a general plant pathological survey of the Dominion, emphasizes the necessity for considerable experimental work and increased activity in this direction. It appears that, no matter how recently land may have become utilized for agricultural purposes, the economic crops soon fall a victim to destructive diseases, which may cause either a direct reduction in yield, or considerable trouble through loss of trade.

DESTRUCTIVE INSECT AND PEST ACT.

A striking example of the latter is afforded by the disease "powdery scab" affecting potatoes. This disease, known for nearly a century in Europe, has been recorded for the first time on the continent of America. Its presence here was regarded by the Dominion Botanist as of scientific interest, and was recorded merely from this point of view. It resembles closely the common potato scab, and is in the opinion of nearly all plant pathologists who have had experience with it, a minor disease, which deserves no more attention than the well-known common scab, which is distributed all over the world. Even under Canadian conditions, the disease, which has been most carefully watched since it first came under observation, has shown itself certainly more harmless in effect than "late blight" or "black leg" or other well-known potato diseases.

There was little reason for this disease to become practically the most notorious plant disease known in Canada. As is well known, the United States authorities considered the disease in quite a different light. They regarded it, because of their having had no actual experience with it, as very suspicious and of sufficient importance to warrant their placing an embargo on all Canadian potatoes. This action made the disease at once—at any rate to the growers and shippers of the Dominion—the most important potato disease. Under ordinary circumstances, the disease would have been dealt with in the manner its minor character deserved, but the embargo affected very seriously the market for the crop of Eastern Canada. For this reason, negotiations were begun by the expert of our department, who was instructed to discuss the conditions under which the embargo would be raised. In June, the Dominion Botanist interviewed the United States Federal Horticultural Board, who were prepared to permit the importation of potatoes, providing certain conditions would be fulfilled. These conditions required certification of all potatoes, after inspection of farms and of the potatoes prior to shipment from the defined so-called "infected area" within the Dominion. The conditions were regarded as very complicated, and their enforcement would require a large staff of inspectors and a considerable expenditure. The department, however, desirous of accommodating the agricultural population of Eastern Canada, who are prominently engaged in raising potatoes, caused these regulations to be explained to the shippers who were most actively interested, i.e., those of New Brunswick. The same conditions were laid by the United States authorities upon the state of Maine (and later New York), on finding these states infected by the same disease. The Canadian shippers unanimously agreed to accept the conditions, and, on representation to this effect being made, the embargo was temporarily lifted from Canada under the conditions exacted. (See circular No. 6, entitled "Regulations under the Destructive Insect and Pest Act governing the Importation, Sale, Shipment, and Exportation of the Common or Irish Potato [*Solanum tuberosum* L.)."

Inspection of potatoes began in December, 1914. A number of inspectors were specially instructed and trained in the laboratories and under the direct supervision of the Dominion Botanist. The work of inspecting all potatoes for export to the United States and to the disease-free area of the Dominion was immense, but was carried on faithfully and to the best of human possibility. From December 13, 1914, to February 26, 1915, 49,343 bushels of "first-grade potatoes" were certified for export to the States, and up to March 31, 1914, 36,689 bushels for the disease-free area of the Dominion. Table potatoes were inspected and certified for the Dominion during the above period, amounting to 440,038 bushels. Altogether, 526,070 bushels of potatoes have been inspected and certified during these months. However, on February 26, a car of Canadian potatoes was held up by the United States inspectors because of the potatoes having been found to be infected with powdery scab. On inquiry it was learned that the official inspector of the United States found, after seven hours' search, two potatoes very slightly affected with this scab. In accordance with the United States regulations relating to the importation of foreign potatoes, the permits issued by the board were cancelled, and further permits were refused. Since then no further exports of Canadian potatoes to the United States have taken place.

From our experience with powdery scab in Canada, and from the experience of plant pathologists of repute in Europe, we were more inclined than ever to the view-point that this disease was not of a character to warrant any such drastic measures. The time, no doubt, will come when the United States authorities will change their attitude towards the disease.

The inspection of the potatoes, quite aside from the question of powdery scab, has been found to improve greatly the quality of potatoes shipped outside the infected area. This work is being greatly appreciated by the shippers and a large number of farmers. They both realize that the continuation of the inspection would be most beneficial. If it is thought desirable to continue this work, the shippers have expressed their readiness to pay an inspection fee, which attitude is considered quite correct. Meanwhile, experiments are being conducted by the Division relating to effective control measures to be taken against the disease.

EXPERIMENTAL AND OTHER WORK OF THE DIVISION.

A large number of specimens of diseased plants were sent in for examination and advice. The experimental work connected with plant diseases included a series of experiments on potato diseases. The prevention of common scab, investigation into the nature, cause, and prevention of more obscure diseases of potatoes, as mosaic, leaf roll, curly dwarf, and internal streak or net necrosis are still receiving the attention of the scientific staff of the Division. The Dominion Botanist, during July and part of August, in company with a number of United States plant pathologists, visited a large number of potato fields in the United States to study the diseases as they occur in the fields. Such visits have been found of great value to the growers, who have taken a keen interest in them, and who will benefit from the experience, explanations, and suggestions for the control of various troubles. The work will be continued this year in various localities of the Dominion.

Mr. J. Adams was absent for several weeks in Prince Edward Island, where he delivered a series of lectures explaining the question of powdery scab and the new potato regulations.

Miss Faith Fyles, an assistant in the Division, was absent in the Western Provinces during the summer to collect exhibition specimens of the common weeds. She also superintended the growing of these weeds in Ottawa to secure seedlings at their various stages. It is intended to prepare a comprehensive exhibit of the weeds of Canada, showing their development from the seed to the mature plant. Farmers who are in a position to recognize the noxious weeds in their seedling stages, and who commence

at such time their eradication, will find the weed problem far less troublesome than those who attack the weeds when they have matured and probably already provided for their perpetuation. The specimens collected have been exceedingly well prepared, and have been arranged for exhibition in a unique and original manner, which will prove most useful.

The number of weeds and wild plants sent in for identification was very large, about 1,000 having been identified and reported upon.

The usual progress was made with the herbarium of the Division and in the botanic gardens. Considerable time was spent in arranging, cataloguing, and indexing the botanical library.

The St. Catharines Field Laboratory is proving of greater value and assistance every year. Very valuable experiments in the control of fruit-tree diseases are being conducted by Mr. McCubbin, the assistant in charge.

A detailed account of the work of the Division of Botany will appear as usual in connection with the Farm Reports.

DIVISION OF ANIMAL HUSBANDRY.

The scope of work of this Division, as in the past two years, includes directly the care, breeding, housing, and marketing of all classes of live stock and their products on the Central Experimental Farm, together with the testing of foodstuffs and the methods in the care and management of stock and of all machinery pertaining thereto. In consultation with the branch Farm superintendents, this Division also assists largely in these various operations on all the branch Farms where live stock is maintained, thus systematizing and consolidating the live stock experimental work.

The live stock work on the Central Experimental Farm was carried on under most unfavourable circumstances during the first part of the fiscal year. The lack of proper buildings was a serious handicap both in the routine work of breeding and feeding, and also in the experimental work along these lines. The summer feeding work was most discouraging owing to the severe drought, which caused extremely poor pasture on the all-too-limited pasture area. The green feed supplied by the Field Husbandry Division to assist in supplementing the shortage of pasture was also a partial failure. Hence, all classes of live stock were fed under most trying circumstances. However, the excellent crop of corn for ensilage facilitated the live stock operations in the fall and winter.

There are now 503 head of live stock in the stables, made up as follows: 159 head of cattle, 26 horses, 98 sheep, and 220 swine.

HORSES.

The horses on the Central Experimental Farm are expected to do all labour connected with the various Divisions. This number of horses includes also four pure-bred Clydesdale mares and four grade Clydesdale mares of good quality and breeding. Breeding operations were started with these mares in the fiscal year ending March 31, 1914. Unfortunately, the four foals were all lost, due to being carried from two to four weeks over time. Two of the mares, more or less subject to intestinal trouble, were lost during the year. These are the only serious losses in our live stock work, and are much to be regretted. A number of the mares are in foal again, and with a promise of better success. Experimental work along the lines of feeding, care, management, and housing of pregnant mares and foals will be carried on.

The horse labour supplied to the various Divisions on the Central Experimental Farm amounted to 7,174 days, which, at the conservative value of 70 cents per day, gives a total return of $5,021.80.

No experimental horse feeding work was conducted during the year.

DAIRY CATTLE.

The pure-bred dairy herds, as previously reported, are Ayrshires, Canadians, Guernseys, Holsteins, and Jerseys. All these herds have made a normal growth during the year, and have given satisfactory returns.

The grading experiment with grade Ayrshires and grade Holsteins has been continued with marked success, and the cows have given excellent returns.

DAIRY CATTLE FEEDING EXPERIMENT.

Many new phases of dairy cattle feeding experimental work have been taken up during the year. Some of the results of these experiments are found in the detailed report of the Dominion Animal Husbandman. Briefly, the lines of work studied are: (1) a continuation of the investigation of the value of molasses and molasses meals in replacing a good grain mixture for milch cows: (2) an investigation of the value of molasses in replacing succulent roughages, such as roots and ensilage; (3) the value of the various grades of elevator by-products (screenings) for the feeding of milch cows; (4) the value of molasses in making some of the elevator by-products more palatable; (5) an investigation as to the value of the various patented calf meals as compared with a good home-made calf meal, with and without whole milk, skim-milk, and buttermilk, in calf feeding.

MILKING MACHINES.

With the completion of the new dairy barn in the fall of 1914, the Sharples and the Burrell-Lawrence-Kennedy milking machines were reinstalled. A series of experiments comparing these two machines with each other and with the best hand milking, from the standpoints of commercial, bacteriological, and pathological values, was started. This experiment will continue over a period of a year or more. Mention, however, is made of some of the results to date in the report of the Dominion Animal Husbandman. In addition to these two machines there are also being tried the Empire and the Lister milking machines.

DAIRY COW RETURNS.

It will again be noted that the quality of the dairy cattle on the Central Experimental Farm has made a marked improvement. The average profit per cow has again increased over $8 per head per annum. Particular attention is drawn to the fact that many of the best cows have not completed their lactation periods at the end of the fiscal year, hence the following table is no definite criterion as a comparison of the breeds. The following is a brief summary showing the returns of some of the cows, the profits being based on the following valuations: Butter, 30 cents per pound; skim-milk, 20 cents per hundredweight; pasture, $1 per head per month; hay, $7 per ton; straw, $4 per ton; green feed, $3 per ton; and meal, $25 per ton.

No. of Herd.	Age.	Breed.	Average Days in Milk.	Average Pounds Milk produced.	Average per cent Fat.	Average Profit over Feed between calvings. (Labour, Manure and Calf not included).
	Years.					$ cts.
50	3 and over..	All breeds and grades...	364	8,108·3	4·47	68·74
5	3 " ..	Ayrshire..............	342	8,148	4·15	58·50
5	3 " ..	Canadian..............	386	7,863	4·80	81·67
5	3 " ..	Guernsey..............	352	7,263	5·55	90·31
5	3 " ..	Grade Ayrshire........	348	9,523	4·02	77·07
5	3 " ..	Grade Holstein........	452	12,976	3·57	92·23
2	2 " ..	Holstein..............	408	7,680	3·63	42·22
4	3 " ..	Jersey................	372	7,998	5·68	110·41

Attention is drawn to the fact that butter valued at 30 cents per pound is equivalent to milk at only $1.65 per hundredweight; yet, in reality, the manufacture and sale of cream cheese, Coulommier cheese, and certified milk, with a large part of the milk, has netted $3 per hundredweight. The above valuations are useful for the comparison of production with the average herds throughout Canada.

BEEF PRODUCTION.

It is to be regretted that, owing to the lack of buildings, no beef-breeding work or beef-feeding investigation work has been conducted on this Farm during the past year.

SHEEP.

Although the great difficulty of the sheep investigation work, namely, the shortage of available land, continues, yet better results than usual have followed the work of the past fiscal year. Breeding work on a small scale with Shropshires and Leicesters has been most successful. Aside from this, a feeding experiment with 120 lambs, investigating the feeding value of elevator by-products and screenings, was conducted, giving valuable results and showing a reasonable margin of profit.

SWINE.

Considering the shortage of pasture, another successful year is to be reported for swine husbandry. The three breeds of swine, namely, Yorkshire, Tamworth and Berkshire, have bred exceptionally well, and there are now in our pens one of the finest lots of breeding stock in Canada.

Several lines of investigation work in the feeding of swine were conducted. Briefly these are: (1) the value of tankage and other foodstuffs in feeding pregnant brood sows, both in the winter and summer; (2) the value of tankage and other meals as milk substitutes, fed in conjunction with other meals to young pigs during and after weaning; (3) the value of elevator by-products (screenings) in feeding four-month shoats for the market. Very valuable data have been acquired in these experiments, which may be found in the report of the Dominion Animal Husbandman.

LIVE STOCK BUILDINGS.

Under my supervision, the Animal Husbandry Division has during the past year finished the preparation of plans and largely supervised the erection of the new dairy barns at the Central Experimental Farm, Ottawa. Illustrations and brief specifications of these barns may be found in the report of the Dominion Animal Husbandman.

Many plans of farm buildings, and specifications for the same, have been sent out to farmers free of charge. It is to be hoped that this work will stimulate the keeping of better farm buildings throughout Canada.

MISCELLANEOUS.

The correspondence of this Division pertaining to the feeding, breeding, care, and management, and housing of animals, together with the prevention and treatment of many of the minor ailments of all classes of stock, has largely increased during the past year.

The Dominion Animal Husbandman, in attending to his duties outside the Central Experimental Farm, has officially visited all of the branch Farms in Canada where live stock work is being conducted. In addition to such official trips, both he and the Assistant Dominion Animal Husbandman have made many trips, attending

a large number of meetings in various parts of Canada, judging at numerous exhibitions, and studying live stock conditions and the needs for experimental and demonstrational work relating to live stock.

DIVISION OF FORAGE PLANTS.

The work of the Division of Forage Plants has, during the year, been carried on with the following objective points:—

(1) The ascertaining, by means of variety tests, of the comparative value, for different parts of Canada, of many varieties of the different classes of forage plants. This work does not only include such varieties as are accessible to farmers through the ordinary channels of commerce at present, but also those hitherto unknown in Canada, which for some reason or other may prove of value to Canadian agriculture.

(2) The production, by breeding according to well-established scientific principles, of new varieties of forage plants superior to those now available. The aim of this work is not only to raise the quality and yielding capacity of forage crops in general but also to produce varieties especially adapted to the various climatic and soil conditions existing in different parts of the country.

(3) The gaining of a thorough knowledge of wild grasses and other plants forming part of wild hay or of natural pastures.

(4) The securing of data bearing on the possible production of seed of forage plants, particularly of field roots, in different parts of the Dominion.

VARIETY TESTS.

At the Central Experimental Farm, as well as at the branch Farms and Stations, a great number of varieties of forage plants, principally of Indian corn, turnips, mangels, carrots and sugar beets, have been tested as to their comparative value.

In all these variety tests the duplicate-plot system, which was introduced for forage plants in 1913, has proven to be of striking value, inasmuch as errors liable to result from variation in the productiveness of the soil in different parts of the experimental fields have been eliminated to a very great extent. The duplication of variety tests has, as a matter of fact, proven not only extremely useful, but even absolutely necessary for the gaining of correct data bearing on the comparative value of different varieties.

In order to secure, furthermore, as accurate a knowledge as possible of the relative value, from the food standpoint, of different varieties, those tested at the Central Experimental Farm have been judged not only by their yielding capacity but also by their chemical composition. Their real value has been calculated from tonnage and chemical composition taken together. In this way the value of the varieties, being expressed in food units, has been more accurately ascertained than previously, when the yield itself was being used as the only basis for the valuation.

BREEDING WORK.

Leguminous Forage Plants.—The breeding work with clovers and alfalfa, started in 1912, is now well under way. Two main objects, viz., increased hardiness and increased yielding capacity, furnish the basis for this work, which promises to lead to very important results.

Breeding for hardiness and increased yield in clovers and alfalfa is made possible by the fact that the forage plants mentioned do not constitute uniform "varieties." On the contrary, they are composed of a large number of distinct types differing from each other as to hardiness as well as to yielding power. These characters, furthermore, have proven to be of a hereditary character, i.e., they are transmissible

from one generation to another. This being the case, the breeding of new alfalfas and clovers simply means isolation and propagation of those types of the said forage plants which possess superior characteristics in the directions mentioned.

In breeding for hardiness, the selection of hardy types is performed by Nature herself. Severe winters and adverse conditions in the early spring weed out all tender types, leaving uninjured only those which possess hardiness enabling them to survive. By propagation of the surviving individuals in an experimental field a crop is secured in which all the individuals are hardy and in which, as a consequence, winter-killing resulting from tenderness is reduced to a minimum.

That, really, by propagation of surviving individuals, hardy varieties can be produced, has already been demonstrated in several instances. As an example may be quoted the results of alfalfa experiments at the Substation at Fort Vermilion, Alta. At this Station, alfalfa has been experimented with for many years, but, unfortunately, without success. In 1913, alfalfa seed was secured from a few plants which had proven able to withstand very severe winters. This seed produced a crop, in which winter-killing was hardly perceptible.

Similar results from other parts of Canada all confirm the correctness of the idea used by the Division of Forage Plants as a basic principle in breeding for hardiness, that, namely, hardiness of alfalfa can be achieved by propagation of hardy individuals, no matter from what "variety" they originate.

In breeding for increased yield, so-called pedigree breeding is being applied, i.e., the breeding is being started from individual plants possessing superior characters. In order to secure material for this work, a number of outstanding plants were either self-fertilized or cross-fertilized in 1913. From the seed thus obtained a number of individual plants, totalling over two thousand, have been secured and transplanted in the experimental field for further study.

Breeding work similar in character to that outlined above is also well under way with red clover. The work with red clover has among other things revealed a fact which may prove of the greatest importance for those parts of Canada where a high degree of hardiness is essential for successful clover growing. It has been found that certain types of red clover are perennial in character, i.e., are able to live four years or more. Efforts are being made to produce, from such plants, a perennial and, as a consequence, perfectly hardy red clover variety.

Grasses.—A total of about three thousand timothy plants secured from self-fertilization of individuals having certain characters indicating superior forage value are being studied. The nature of the breeding work with timothy, as explained in previous reports, makes it impossible to expect results after only a few years' breeding work. The results obtained so far indicate that the object aimed at, viz., the production of uniform varieties of a superior forage value, will be materialized in due time.

Breeding work, similar to that under way with timothy, has also been started with Orchard grass, Western Rye grass, Meadow Fescue, and other grasses.

WILD GRASSES.

The herbarium material of grasses and kindred plants necessary for the correct understanding of the nature and merits of natural pastures and of hay made from wild grasses is steadily being increased. In addition to a vast collection of grasses, made principally in British Columbia, about 800 sheets of European grasses and sedges have been secured through exchange.

A great number of specially selected grass specimens have been collected for exhibition purposes. The majority, representing 175 different species, are being exhibited in the Canadian pavilion at the Panama-Pacific International Exposition, San Francisco, California.

SEED PRODUCTION.

With a view to improving old varieties of field roots by breeding, preparatory experiments were started with mangels and turnips on a small scale in 1913.

In 1914, when the conditions in the root seed producing countries of Europe threatened to make a normal supply of seed impossible, steps were taken to secure data bearing on the possibility of producing field root seed profitably in Canada. As large quantities as possible of suitable mangels and turnips were selected as seed roots for the year 1915.

POULTRY DIVISION.

GENERAL DEVELOPMENT OF THE WORK.

Since the enlargement of the Poultry Division two years ago, the work has been gradually increasing, and the demand for still greater expansion is more and more apparent. For, though so much has been done to encourage the producer, Canada, according to the Customs returns, even yet does not produce eggs sufficient for her own requirements.

Eleven of the branch Farms and Stations this year are equipped for work in poultry and practical demonstrations are being conducted thereat. On the Central Farm the stock has been more than doubled during the past year, and good beginnings have been made with turkeys, geese, and ducks.

NATURE OF THE WORK.

This Division aims to help the farmer who keeps a small flock of hens as well as the man who depends upon the flock for a livelihood, and with this end in view many of the problems that face the producer are receiving attention, and as the laboratory equipment at Ottawa is increased, research in more of these will be instituted. Among the questions that are receiving immediate attention are: Better housing, cheaper feeds, healthier stock, more suitable varieties, decrease of mortality, incubator problems, better and stronger fertility, higher average egg yield, larger eggs, better preparation for market, best methods of shipping eggs for hatching, day-old chicks and breeding stock, the production of early winter eggs, a more even distribution of what the producer has to sell, the practicability of water fowl on the farm, the prevention or cure of blackhead in turkeys, as well as a number of other common diseases to which poultry of all kinds are subject.

BUILDINGS.

The three small buildings erected at the Central plant a year ago have proven very helpful in the work. The experimental breeding house has made it possible to carry on some special mating experiments. The cockerel house has served the purpose for which it was originally intended during the winter months, and has proven to be a satisfactory brooder house for chicks in the spring and summer; the feed and storehouse has rendered this end of the work more convenient, and the basement is being utilized as an incubator cellar.

The new administration building which was expected during the year has not yet been built and, because of this, the old buildings are still retained, but it is hoped that this building will be available very soon, when laboratory space will be provided and more investigational work taken up.

THE WATER FOWL PLANT.

Upon the area of land and water which was inclosed last year for a duck pond, a small cottage for the attendant has been erected. During the year this plant was utilized for the water fowl, and breeding turkeys also were placed there quite recently.

This makes an ideal spot, especially for the water fowl, as considerable water is included inside the fence. Small yards reaching to an artificial pond have been constructed for the use of the breeding stock early in the spring before the water comes into the canal.

This addition to the Central plant provides a much-needed range and makes it possible to carry on work that has been in contemplation for some time. It also adds to its general appearance by turning wild land into a water-fowl park.

THE EQUIPMENT AT THE BRANCH FARMS.

The poultry plant at each of the branch Farms and Stations is more for the purpose of demonstration than experiment, and therefore comprises what might be considered ideal conditions for a farm poultry plant that is run on a commercial basis. Some of these Farms have their complete equipment, which includes houses of various types and sizes, sufficient in all to accommodate between three and four hundred laying hens; incubator and brooder equipment to reproduce from one-half to two-thirds of the flock each year; an administration building, the basement of which is used for an incubator cellar, the first floor for office, bed-room and feed-room, the attic for store-room.

NUMBER AND VARIETIES OF STOCK.

The stock includes ordinary fowl (hens), turkeys, geese, and ducks. The varieties as a rule are those which are considered to be more or less of a general-purpose character, and especially suitable for farm conditions. Hens, water fowl, turkeys, and guineas are bred at the Central plant, while all the branch Farms that have poultry plants keep hens, though only those specially situated have turkeys or water fowl.

The old hens, that is, those birds that have passed through their second laying season, are sold immediately after the breeding season, usually in June. The selling of these at this time gives more room on the plant for the growing chicks; it also puts on to the market poultry flesh when it is comparatively scarce and consequently high in price, and indirectly it assists the market later on in the summer and fall when, as a rule, poultry meat of all kinds is marketed.

At the Central Plant.—During the past year the stock at the Central Experimental Farm has been materially increased. On January 1, 1915, there were 849 birds, 146 of which were water fowl, turkeys, and guineas. Of the fowl, the Barred Rocks predominated, with White Leghorns second. These are followed by several pens of White Rocks and White Wyandottes and smaller lots of White, Buff, and Black Orpingtons, Black and Brown Leghorns, and Black Minorcas, besides single matings of several other varieties. In ducks there are several matings of Indian Runners, Pekins, and Cayugas, and a pen each of Aylesburys and Rouens. In geese, Toulouse, Embden, African, and Wild were represented, and the variety of turkeys was Bronze.

At the Branch Farms.—Seventy-five per cent of the hens on the branch Farms belong to the general-purpose breeds, such as Rocks, Wyandottes, etc. The remaining 25 per cent are White Leghorns, the most of which are at Agassiz, B.C., and Lethbridge, Alta., where the climate is better adapted to tender varieties, but even there it is found that the general-purpose breeds are giving better satisfaction, and as a consequence the proportion of lighter breeds will be diminished.

About 300 laying hens are kept at each of the branch Farms. As a rule, 200 of these are pullets and 100 year-old hens. The pullets are tested the first year by the trap-nest and are fed for egg production, and 100 of the best of these are kept until the following year, when from them eggs are taken in the breeding season for hatching purposes.

With this arrangement it is necessary to mature 200 selected pullets each year; this means that at least five or six hundred chicks are raised to maturity. About 50 per

cent are cockerels, the best of which are retained for selling as breeders to the farmers. Of the 300 pullets, 200 are selected for the laying pens.

From one to four varieties are bred at the branch Farms, though it is not the intention to keep too many varieties but rather to eliminate those which are the least satisfactory and confine attention to the one or two which prove most practical for the locality.

MEETINGS.

The demand for speakers has been, if anything, greater than usual. Mr. Fortier has been absent 111 days during the year, has lectured at sixty-one different places and judged at eighteen shows throughout Quebec and Ontario, and the reason that he did not get to more meetings was because of his inability to leave the office. Mr. Robertson has attended a few but has been unable to be absent from the plant for any length of time, though numerous requests have come for him, especially to judge. Mr. Elford attended a number of meetings, but his work here and in connection with the branch Farms has made it impossible for him to attend very many. He made two visits to the branch Farms and Stations inspecting the poultry work, and a number of "Patriotism and Production" meetings were attended by him during the "campaign."

CORRESPONDENCE.

The correspondence of the Division is very heavy. Information in circular form assists considerably, but the number of questions that have to be answered individually seems to be growing.

THE TOBACCO DIVISION.

The scope of the Tobacco Division was enlarged at the beginning of the season of 1914-15, by the appointment of two crop inspectors, one for the province of Quebec, the other for Ontario.

The season of 1914, though not altogether favourable for tobacco growing, allowed of the harvesting of an average crop, although slightly later than in a normal year; in Quebec, the establishment of the plantations was considerably retarded by a prolonged drought. In general, however, the crop ripened sufficiently early, except in those plantations harvested in September, the early part of the month being marked by continued rain.

CENTRAL EXPERIMENTAL FARM.

Plantation.—Among the varieties lately tested is a large number of types of the small-leaved Canadian tobaccos and also some large-leaved pipe tobaccos such as "Gold Leaf" and "Maryland," etc. In spite of a somewhat cool season, all these tobaccos were harvested well before the first frost.

An abundant supply of tobacco seed was obtained, which was distributed in part during the winter of 1914-15.

The drying process was carried out without difficulty or delay.

Fermentation.—The tobaccos of the 1914 crop were tested at Farnham but, during the summer, an experiment in betuning with part of the 1913 crop, was carried on at Ottawa. The results were interesting, especially with a view to the preservation of tobacco from injury by mould.

STATION AT ST. JACQUES, QUE.

The seed treated with formalin grew well. The establishment of the plantation, however, was hindered by drought, and the crop harvested was a little below the average.

A good selection of Yamaska and of Big Ohio × Sumatra was made, notwithstanding, and some hybridizing was done. The work of drying in the open field, which had been successfully carried out in 1913, was made easier by the use of stronger and more suitable material for the drying frames. The drying process was completed in good time, with the aid of charcoal stoves.

STATION AT FARNHAM, QUE.

Although there was an abundant supply of plants, it was impossible to plant the whole area intended for tobacco. About three arpents were cut off.

The drought of early June was accompanied by such violent winds that, in spite of abundant watering at planting time, the plants established themselves with great difficulty, and certain parts had to be entirely replanted several times. Watering had to be continued, a tedious and costly process and one beyond the means of the average grower.

The harvest was a normal one, and ripening took place in good time although the tobaccos did not have the characteristics of a crop ripened under more favourable conditions.

The placing of the tobacco on the racks, and its drying in the open field without letting the tobacco lie on the ground, was carried on on a larger scale than at St. Jacques.

The drying racks were covered at night and on rainy days. By this means the yellowing of the tobacco was effected more rapidly and without risks. This with the use of charcoal stoves in the curing shed, reduced the drying period materially.

Systematic experiment with chemical fertilizers has tended to verify the formula already recommended to the tobacco growers of Quebec.

STATION AT HARROW, ONT.

The plantations were made during a showery and rather cool time. This aided the plants in establishing themselves, but was also favourable to the cutworms, which were especially troublesome.

The soil in the seed-beds was treated with steam. The results were more marked and more favourable than were those obtained by using formalin.

Among the varieties of tobacco grown at Harrow in 1914 were several types of burley, recently obtained from Kentucky. Many of these were interesting and some proved superior to the type of "Improved White Burley" grown at Harrow for some five years, and coming originally from the Experiment Station at Lexington, Ky.

Among the yellow, flue-cured tobaccos, the "Yellow Prior" and "White Stem Orinoco" are noted for their adaptability to the climate of Ontario, and furnish a product of good colour. Some of the Italian varieties give a good proportion of clear yellow leaves, but their texture is somewhat weak.

As at Farnham, systematic experiment with chemical fertilizers is being carried on at Harrow. Although some deductions may be drawn by the reader from the results obtained in 1914, nothing conclusive can be stated from only one year's work.

The same system of harvesting practised at St. Jacques and at Farnham was introduced at Harrow in 1914. The results will be more easily judged in an autumn more favourable for the drying process, this period in 1914 being marked by a prolonged spell of damp weather which caused mould to appear in some curing sheds.

INSPECTION.

This work was carried on mainly in eastern Ontario, the inspector for Quebec having been called to the French colours in August. The Ontario inspector besides his special work, supervised the experiments carried on at Walkerville in the use of acid fertilizers to prevent the damage done by tobacco root rot.

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND, CHARLOTTETOWN, P.E.I.

THE SEASON.

The snowfall during the winter of 1913-14 was heavy and gave good protection to shrubs and plants during the very low temperatures of February. The weather remained very backward throughout the whole month of April, and an ice storm occurred on April 21 that broke many shade and fruit trees. Sleighs were in use on the roads after the storm on May 2, but the cold dull weather cleared up after another heavy snowfall on May 11, and the weather for the remainder of the month was favourable for work and plant growth. Seeding began May 18 and became general on the 22nd, about one week later than usual. The trees appeared green May 28. During June, rain occurred on seventeen days, and vegetation remained backward owing to the cold nights, the excessive moisture, and the absence of any really hot days. Seeding was completed by June 20. The first part of July was cool. The hay crop thickened up splendidly, and cutting began on July 15. The crop was heavy, and less than one-half had been saved at the close of the month owing to unfavourable weather. The crops grew well during the favourable weather of August. The second week was hot, being splendid for haymaking, which was completed about the middle of the month. The first grain harvested at this Station was Daubeney oats, which were cut on August 20. Harvesting became general about September 1. During the first and fourth weeks of September the hottest weather of the season occurred. The greatest harvest for a number of years was almost all saved during this month in good condition. October and November were exceedingly fine, fall ploughing being delayed owing to lack of moisture in the soil. Fall tillage operations, however, were well completed before winter set in. December came in so mild that ploughing was continued up to the 5th. Winter began in earnest on the 22nd, with heavy gales and snow which were followed by unusually low temperatures at Christmas, the thermometer dropping to —10·1° F. on three different days, and the winter ice-breaking steamers were obliged to go on the Georgetown-Pictou route on December 24. The balance of the winter was very mild, with the exception of one cold week about the first of February. Carriages were used more than sleighs during each of the winter months.

METEOROLOGICAL RECORDS.

Months.	Temperature Fahr.					Precipitation.					Bright Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
	Date.	Deg.	Date.	Deg.	Deg.	Days	Ins.	Days	Ins.	Ins.	Hours.
1914.											
April	28	56	3	8	32·6	6	1·33	6	24·5	3·78	194·9
May	21	76	1	26	48·548	8	1·2	2	8·5	2·05	191·4
June	24	79	3	34·5	54·741	17	5·32	....	......	5·32	247·7
July	17	82	2	37	63·201	8	2·84	......	......	2·84	277·9
August	11	84	25	46	64·	15	2·43	......	......	2·43	247·9
September	23	87	29	35	59·016	12	5·02	......	......	5·02	191·
October	5	72	7	26	47·823	16	3·57	......	......	3·57	135·9
November	2	59	19	11	35·284	9	2·29	4	3·6	2·65	96·5
December	1	50	25	–10	22·709	4	1·1	7	9·2	2·02	99·9
1915											
January	20	48	31	–14	21·58	6	2·62	11	27·	5·32	72·4
February	7	49	2	–13	22·624	10	1·54	3	8·	2·34	94·6
March	26	45	27	10	25·774	......	......	18	23·5	2·35	86·4
Total annual	....	....	....	....	....	111	29·26	51	104·3	39·69	1,936·5

BUILDINGS.

The old coach-house was remodeled, with a veranda built across the south end and along the east side. This and a comfortable cloak and toilet room for ladies who come to the Station on picnic excursions were much needed for our visitors. A stove, sink, and drip-board, with plumbing connections, were placed in a lunch room for the men, and were found very convenient in connection with serving hot tea and coffee to the Farmers' Institute excursions.

Two colony houses and a few small rearing-houses were added to the equipment of the poultry yards. A bee supply house was fitted up near the apiary.

UNDERDRAINAGE.

The work in underdrainage was begun as early in the spring as the frost would permit, and the greater part of the wet or late areas of land on the farm were drained before planting. The balance of this work was completed in the early autumn. Some 6¼ miles of tile were laid during the season, draining about 28 acres.

HORSES.

The six horses at the Station are in good condition for the spring work. A team of pure-bred Clydesdale mares were purchased in the spring of 1914. One of the mares, "Darling of Taunton," No. 18507, is now carrying a foal by "Baron Kelvin."

DAIRY COW.

The milk cow, "Plum," calved in June and, after recovering from an attack of milk fever, produced 6,646 pounds of milk in ten months. Her profits over the year's feeding expenses were $63.09. She was milking well at the close of the fiscal year, when she was sold to make room for two pure-bred Ayrshire cows, "Island Queen of Spruce Row" and "Lady Petunia of Spruce Row." These promising young cows are the beginning of an Ayrshire herd for this Station.

STEERS.

The steer-feeding experiments were continued with three pens of four steers each. Good feeders of a beef type are not plentiful in this province, and the steers fed had more or less of dairy blood in them. The following prices, live weight, were obtained at auction, according to quality: four good steers, 7¾ cents per pound; four medium steers, average price 7½ cents; four light dairy steers averaged 6⅝ cents per pound. The cattle were fed at a good profit. Details will be found in the Animal Husbandry section of the report.

SHEEP.

The small Leicester flock of sheep gave a good crop of lambs in the spring of 1914. This flock was found to be badly infested with internal parasites. Treatment for these is still being continued.

LAMBS.

The lamb-fattening experiment with different roughages was continued, and a good margin of profit realized from the better rations.

POULTRY AND BEES.

These two lines of work were under the care of one man. The poultry plant was enlarged and the flocks of Barred Plymouth Rocks and White Leghorns were increased. Experimental work with cotton-front colony houses and straw-loft houses showed the

cotton front type of house to be satisfactory. The houses with straw lofts were drier under all weather conditions than those without.

The bees produced a fair amount of honey, and the five colonies increased to nine. An experiment with out-door *versus* cellar wintering was tried, four colonies being left in a sheltered location outside. A spring examination revealed two colonies dead in the bee cellar and also two dead in the outside wintering case, although all had an abundant store of honey.

CEREALS.

The season was favourable, and large crops of cereals were harvested in good condition. Co-operative work with three varieties of oats was continued with a number of farmers. At the end of the third season's work, Banner oats maintains a good lead over the other varieties tested.

FARMERS' PICNICS, VISITORS.

The Farmers' Institute picnics were increasingly popular, and many farmers visited the Station in this way during the season, when they could see for themselves what was being done in experimental and demonstration work. Educational addresses and agricultural lectures,were given at these picnics by the leading men of the province, and were greatly appreciated by the excursionists. The number of visitors recorded during the year was 5,296.

EXHIBITIONS.

With the assistance rendered from Ottawa, an exceedingly fine exhibit was put up in the most central part of the exhibition building at Charlottetown during the Provincial Exhibition, September 22 to September 25, 1914. This exhibit attracted much attention and received very favourable comment. An interesting display of flowers, fruit and honey was made at the second annual flower show held in August, 1914. The superintendent judged at several of the county exhibitions.

CONVENTIONS AND ASSOCIATIONS.

The superintendent was present and took part in the discussions at the various conventions and association meetings in the province, and in connection with the Maritime Winter Fair at Amherst, N.S. He gave an address on the "Improvement of Seed Grain in Prince Edward Island" at a meeting of the Canadian Seed Growers' Association for Nova Scotia during the short course at Truro, N. S.

SHORT COURSES AND AGRICULTURAL MEETINGS

The superintendent gave instruction in field husbandry at the Prince Edward Island short course in agriculture held at Charlottetown during January, 1915, and in floriculture at a number of the short courses in household science held during January and February, 1915. Instruction was also given in field husbandry at the agricultural short course held in Shubencadie, N.S., February 8, 9, 10, 1915.

Farmer's Institute and Women's Institute meetings were addressed at various times in different parts of the province, and a series of meetings were addressed in the Musquodoboit and Stewiacke valleys in Nova Scotia during February, and another series of meetings were held along the Canada Eastern railway at Doaktown, Blackville, and Millerton in New Brunswick during March, 1915.

SALE OF SEED GRAIN AND DISTRIBUTION OF SEED POTATOES.

Ten lots of registered Banner oats of the second generation, one lot of registered Red Fife wheat, and three lots of Manchurian barley were sold to farmers. Twenty samples of potatoes were sent out in April, 1914.

A considerable quantity of first generation registered Banner oats and Marquis wheat has been sealed by the inspector, and will be sold to prospective members of the Canadian Seed Grain Growers' association, in the spring of 1915.

EXPERIMENTAL FARM, NAPPAN, N.S.

SEASONAL NOTES.

During the winter of 1913-14, a most satisfactory covering of snow remained on the ground, from the 25th of December to the second week in March. During the latter part of March and the first of April, however, heavy thawing and freezing occurred; this helped reduce the hay crop since practically all the clover was winter-killed. April was unsettled throughout. May gave promise of being a favourable month, but a change took place toward the latter part with the result that June came in with very unseasonable weather, light flurries of snow, and low temperatures.

Notwithstanding this, however, all grain was sown during the occasional fine days of the last week in May and the first week in June. The weather continued cool during the remaining part of the month, but germination took place much more rapidly this year than last. The grain was only seven days in showing above the ground, whereas last season it was from eighteen to twenty. Neither corn nor grain made much growth until the latter part of July, then both came on very rapidly. July and August were undoubtedly the best growing months, but fruits and vegetables did not do very well. Very favourable conditions maintained until the latter part of September, from which time dull, cold weather prevailed until the end of the season, with an occasional fine day. Up to October 16, weather conditions were most favourable for harvesting, but a cold spell was experienced after that date, causing some delay. All fruit was harvested in good condition.

Quite heavy frosts were recorded during the early part of October. Only fair progress could be made in the fall ploughing, since much of the land was too wet. The total precipitation for the month was 2·46 inches. Cold, wet weather prevailed throughout the first three weeks in November. The remaining part was fine and mild. The total precipitation for this month was 2·97 inches. The weather was rather unsettled during December. The first two weeks were fairly fine, with occasional snow flurries. Fairly heavy showers, with low temperatures, characterized the latter part.

It may be said that it was a very open fall with considerable rainfall followed by a very open winter with much mild weather during the latter part.

SOME WEATHER OBSERVATIONS taken at Nappan Experimental Farm, 1914-15.

Month.	Temperature, Fahr.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
1914							
April	61	8	33·94	1·89	18·00	3·69	172·05
May	79	24	49·03	·75	.....	·75	147·10
June	77	26	54·19	4·23	.....	4·23	243·50
July	84	35	61·54	3·61	.....	3·61	255·00
August	84	40	62·84	2·95	.....	2·95	210·80
September	84	33	56·25	3·05	.....	3·05	161·75
October	69	20	47·02	2·46	.....	2·46	139·35
November	60	7	33·59	2·97	.....	2·97	85·75
December	51	−17	20·22	1·46	.....	1·46	110·15
1915							
January	53	−10	21·61	2·69	4·00	3·09	75·10
February	54	−14	23·64	1·01	3·00	1·31	94·70
March	48	9	26·35	.....	12·00	1·20	75·00
Total for year	....	....	....	27·07	37·00	30·77	1770·25

BUILDINGS.

The herdsman's house was moved up on the hill just east of the main barn, a much more suitable location than the old one. This house was too small and in poor shape, hence it was repaired throughout and an addition built on to the east side, 18 by 22 feet, and fitted up with bathroom and w.c. complete.

The implement shed, located south of the horse stable, was repaired and moved back some 25 feet and east 60 feet. The carriage shed, which stood just east of the Superintendent's house, was repaired and moved down and joined on to the west end of the implement shed. A number of internal changes were made in this carriage shed.

The ice-house, which formerly stood just north of the carriage house, was moved to the corner of the field east of the main barns.

One incubator and feed house, 18 by 26 feet, was erected, also one permanent poultry house 16 by 32 feet, and one brooder house 12 by 14 feet. For further details of new buildings see poultry report for Experimental Farm, Nappan.

ELECTRIC LIGHT SYSTEM.

A complete electric light system has been installed during the past season, with an all-day service.

FENCING.

Some three acres were fenced in for poultry runs. Turned cedar posts set at a distance of one rod apart, were used, with electric weld poultry wire for the main run. Smaller runs for breeding stock were built in front of the houses, but Page poultry wire was used instead of electric weld, which will give a test as to which will be more suitable. All fences were gone over in the spring and given general repairs.

CLEARING LAND.

Some 16 acres of land were cleared and broken during the summer at a cost of $24.20 per acre. The plough called the "Manitoba Brush Breaker" was used and proved to be an excellent plough for the work, four horses being used on it.

ROADMAKING.

The split-log drag was put over the main road, east and west of this Farm, several times during the early part of the season. The road machine was also used on a short section of it. In this way it is hoped to encourage the up-keep of the public roads. All the main drive roads on the Farm were gone over several times and dressed up, thus preventing the growth of weeds.

LIVE STOCK.

A most successful year can be reported from this Farm in all experimental work with live stock.

The experiment of grading up a bunch of common dairy cows of this district, by the use of pure-bred sires, started in 1911, was continued. The results obtained up to date are most encouraging, as a large percentage of the progeny are giving every evidence of being superior to their dams. (See table of production under division of dairying.)

A similar beef feeding experiment to that conducted the two previous years was again carried on, and most satisfactory results obtained. Twenty-four steers were divided into two main groups, according to fleshing and type, into good butchers and good stockers. These were subdivided into heavy-fed and light-fed groups, each of these in turn was further subdivided into lots fed different rations. The profit per steer ranged from $12 on the smaller to $23 on the larger ones.

The experiment in feeding lambs was of the same nature as that for 1913-14, but instead of clover hay, broadleaf was used. Fifty grade wethers were purchased for this test. These were divided into four lots and fed on different rations. Lots 1 and 2 received timothy hay and meal. Lots 3 and 4 received half broadleaf and half timothy hay and meal. Lots 2 and 4 received roots in addition to the meal ration. The profits per lamb were as follows: Lot 1, $0.64; lot 2, $0.63; lot 3, $0.36; and lot 4, $0.29; showing the superiority of timothy hay over broadleaf hay in feeding lambs.

A very successful year can be reported in breeding swine. Some thirty-three pure-bred pigs were sold during the season, and three young sows kept to increase the herd.

The pure-bred Shropshire flock started in 1912, has given very satisfactory returns during the winter of 1914-15. The yield was nine lusty lambs from eight ewes.

CEREALS, ETC.

Eleven varieties of wheat were tested and ranged in yield from 26 to 46 bushels per acre; twelve varieties of oats ran from 81 to 100 bushels per acre; six varieties of two-row barley ranged from 30 to 60 bushels per acre; six varieties of six-row barley ranged from 27 to 57 bushels per acre.

The buckwheat plots did not do as well as they should have, being grown between two rows of large apple trees. Five varieties were sown, with yields from 30 to 38 bushels.

Peas were badly infected with blight, hence the crop was not worth reporting.

Nine varieties of ensilage corn were sown, and ranged in yield from 7 to 18 tons per acre.

Sugar beets yielded very satisfactorily, four varieties being tested, giving a yield of from 9 tons 200 pounds to 9 tons 1,200 pounds per acre; thirteen varieties of turnips gave yields from 20 to 27 tons per acre; eleven sorts of mangels from 9 to 20 tons per acre. The six varieties of carrots gave from 11 to 19 tons per acre.

Some sixteen varieties of potatoes grew very well, nothwithstanding the fact that the soil was not as friable as it might have been. The yields were from 135 bushels 42 pounds to 333 bushels 18 pounds per acre.

The quality of the large fruit was such as to compensate for the low yield; more especially is this true of the apples. The commercial orchard made very satisfactory growth during the year. Careful data are being kept of the returns of this orchard in order to demonstrate the actual cost of bringing it into profitable bearing.

Small fruits gave very meagre returns. The location of this plantation is undesirable, and is now being changed. Strawberries were injured to some extent by the severe freezing and thawing during the winter of 1913-14, consequently winter-killing was much in evidence.

An experiment with spray mixtures was carried on as follows: Lime-sulphur and Black Leaf 40 *versus* lime-sulphur and lead arsenate, also lime-sulphur *versus* Bordeaux mixture. The best results were obtained from the use of lime-sulphur and Black Leaf 40, also from lime-sulphur over Bordeaux. (For further detail see horticultural report.)

All flowers at this Farm did exceptionally well, considering the late spring and cool summer.

An exhibit of farm produce was made at Shubenacadie on September 23 to 25, Kentville, October 6, 7, 8, and 9; and at the Maritime Winter Fair from December 7 to 10.

MEETINGS ATTENDED AND ADDRESSES GIVEN.

During the year the Superintendent gave addresses at a series of meetings on "Patriotism and Production," held at Port Elgin, N.B., Sackville, N.B., Rexton, N.B., Petitcodiac, N.B., Doaktown, N.B., Millerton, N.B. and Blackville, N.B.; attended the Farmers' and Dairymen's convention at Fredericton, and gave an address on beef cattle; judged the school gardens for Salem, West Leicester, East Leicester, Mansfield, and Little River schools, giving them a talk on school gardens; also attended the conference of officials and superintendents held at Ottawa from January 14 to 20, 1915.

There were six picnics held at this Farm during the summer months. The number of visitors recorded during the year was 2,652.

EXPERIMENTAL STATION, KENTVILLE, N.S.

THE SEASON.

The temperature during the latter part of April and the first part of May was fairly uniform, with no warm periods to force growth, with the result that plants made little growth until after the middle of May. The mean average temperature for the period from the middle of April to May 1 was 41·2 degrees, and for the following two weeks ending May 15, 43·4 degrees. The mean average from May 15 to June 1 was 57·5 degrees. The spring was a normal one in that, as a general thing, good growing weather does not start until about the middle of May. There were 9, 4, 3, 2 and 1 degrees of frost on the 1st, 2nd, 12th, 16th, and 17th of May, respectively. On the 4th of June there was a severe frost in parts of the valley which did much damage to fruit trees in bloom. Frost was noticeable at this time at the Station; the thermometer registered just 32 degrees, but it was not heavy enough to do damage.

The first part of May was dull, with no good drying winds, and as a result spring work was late. The first seeding was done May 20. Crops generally came on rapidly during the latter part of May and June, except corn which, owing to a cool June, made slow growth. In some places early seeded corn just through the ground was killed by the June 4 frost. The rainfall during June was 4·2 inches, but this was followed by a dry July, for which month only 1·45 inches fell. Crops did not suffer as

much as might have been expected, due largely to an absence of prolonged hot, drying winds. August and September were, on the whole, favourable months, and corn and roots made fair growth. The fruit crop was not heavy, especially in sections hit by the June frost. The fruit as a general thing was well sprayed and packed out good in quality. The first fall frost of 5 degrees which damaged corn not cut, came October 1. Weather was favourable for the fruit crop harvest and it was completed before heavy fall frosts.

November was a good month for finishing up fall work, and ploughing was possible, except for a short period, during the whole month. There was little bright sunshine during the first half of the month; the total rainfall, however, was light and in some cases a shortage of water in wells was reported. The first week in December was open, and ploughing was possible on the 5th. There was a fall of snow on the 23rd of 8·02 inches, which made good sleighing for Christmas. The thermometer registered 6, 4 and 5 degrees below zero on the 25th, 26th and 27th, respectively.

January was unusually mild, with the lowest 1, 4, and 4 degrees below zero on the 5th, 30th, and 31st, respectively. There were three heavy thaws during the month, and rain fell on twelve days. Much damage was done to the fields from washing, and in many cases deep gullies were cut out by the water. There was good sleighing only from the 21st to the 23rd, and although 21·12 inches of snow fell, this was followed by mild weather which soon melted it. February was also mild after the first week, and there was little snow except from the 1st to the 6th to make sleighing, and as a result, lumbering and getting out wood were seriously hampered. There was little rain during the month, and although the temperatures for Feb. 2, 3, 4 and 5, were 9, 4, 2, 1 degrees below zero, Fahr., after that time the temperature did not go below 10 degrees above zero, which was very unusual. March was an even month with not enough snow at any one time for sleighing, and no rain fell during the month, with the result that the usual flooding from spring rains did not occur.

METEOROLOGICAL RECORDS.

WEATHER OBSERVATIONS taken at Experimental Station, Kentville, for 1914.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
1914.	°	°	°	Inches.	inches.	inches.	hours.
April	36·8	72	16	1.48	8.5	2.33	196.
May	50·72	84	23	1.26	2.0	1.46	189.6
June	56·2	82	32	4.2	....	4.2	250.3
July	62·88	85	39	1.45	....	1.45	238.9
August	63·	87	40	2.58	....	2.58	211.1
September	57·6	88	35	3.65	....	3.65	173.8
October	49·5	70	25	1.90	....	1.90	158.2
November	36·4	65	5	3.09	1.0	3.19	109.7
December	22·89	56	6	1.57	10.18	2.58	85·1
1915							
January	22·83	56	4	2.64	21.12	4.75	73·4
February	25·61	54	9	0.63	6.25	1.25	99·6
March	26·81	50	9	....	9.5	0.95	103·1
Total	....	....	....	24.45	63.55	30.29	1888·6

CROPS GROWN.

Seventeen acres of oats sown on newly cleared land produced an average of 47 bushels per acre. The total area in oats, including the different fertilizer plots, was 31½ acres. Twenty-two acres of this was seeded to clover and timothy, which started well and gives promise of a good crop for next year. Ten acres were planted to potatoes, of which 5 acres was poor land without fertilizer to find out the uniformity of the land for future experimental work. The crop on this was light and small and most of it was fed to the stock. Three acres were also in fertilizer tests and averaged 64½ bushels of oats per acre. A block of one-half acre of Delaware yielded 142 bushels per acre, and one-half acre Empire State, 137 bushels potatoes per acre. Four acres of turnips sown early in June yielded 680 bushels per acre, and 1 acre seeded July 4 yielded 490 bushels per acre. The total turnip crop was 3,013 bushels. Ten acres of corn yielded an average of 12 tons per acre, 120 tons of ensilage corn fairly well matured was put into the silo. The area in hay was very limited, and 16½ tons only were secured. One acre of winter rye was cut for green feed for stock. An acre was seeded to alfalfa, which has made a fair start.

FRUITS PLANTED.

Additional plantings have been made of orchard fruits, and the area now in orchard is 42 acres, comprising 1,068 apple, 259 pear, 175 cherry, 398 plum, 102 peach, and 25 quince and apricot trees, or a total of 2,027 trees. Four thousand strawberry plants were set, also a number of new sorts for experimental purposes. The bush and cane fruits have made good growth and should give good crops next season.

LAWNS, SHRUBS AND TREES.

The lawns suffered very much during the summer from lack of rain. The land is light and poor, and will have to be fertilized to get a good lawn. The shrubs and ornamental trees have made a fair start.

FENCING.

Fifty-four hundred feet of fence were erected to inclose the ravine in order to use it for pasturage. Parts of this were difficult to construct, it being necessary to clear and stump the area through which the fence was built. Cedar posts were set one rod apart, and plain wire was used.

DRAINAGE.

Two thousand feet of underdrains were put in on an area to be used for permanent fertilizer plots.

ROADS.

In order to avoid fencing along the main road to the rear of the farm, a road for stock was cleared along the west edge of the ravine. An area 30 feet wide and 2,850 long was cut, stumped and ploughed.

CLEARING LAND.

Twenty acres of land were cleared of stumps and brought under the plough. This area, for the most part, had been in hardwood, and many of the stumps were large and much expense was involved in getting the land in condition for crops. It will be necessary to use 15 acres of this land for corn next year. A 7-acre block cost $226.79 per acre to clear, and the balance cost $256.89 per acre.

OVERFLOW WATER.

The fields at the front of the Farm incline abruptly toward the north and, with a heavy rain, serious flooding and washing of the lower areas result. Stone drains constructed to carry the surplus water away were washed out, and much damage done to the main drive road. Catch basins with large pipe to carry the water were filled with sand, making it necessary to dig the pipe up to clean out the obstruction. On the whole, the taking care of the surplus water during heavy fall or spring rains is a rather difficult problem.

EXPERIMENTAL ORCHARDS.

Experimental orchard work at Falmouth, Hants county, N.S., Berwick, Kings county, N.S., and Bridgetown, Annapolis county, N.S., was continued this season. Much information of value to the growers is being obtained in these orchards. The work at Falmouth and Berwick was conducted by Mr. Arthur Kelsall, and at Bridgetown by Mr. M. P. Pike.

FERTILIZER EXPERIMENTS.

A number of fertilizer experiments have been conducted during the year, and information of value to those who use commercial fertilizers has been secured.

CEREAL PLOTS.

The area suitable for cereal plots is limited, and cereal work was confined to two varieties each of oats, barley, and wheat in plots of one-half acre each.

ROOTS AND CORN.

Tests were conducted with some of the better known varieties of roots and corn. Longfellow seems to be the most suitable silage corn.

VEGETABLES.

Tests were conducted with the leading varieties of vegetables.

FLOWERING PLANTS.

The grounds were made particularly attractive by a free use of annual and perennial flowering plants, which were much enjoyed by visitors. The sweet peas were exceptionally good.

APIARY.

The apiary was increased somewhat during the season. The year was not favourable for a large crop of honey, and only a small quantity was extracted.

POULTRY.

The poultry work has been extended and a new house erected for 100 hens; this, in addition to the seven colony houses, gives housing room for 250 laying hens. A brooder house has also been built. A house 18 by 25 feet formerly used for poultry has been changed into a service and incubator building. A cellar was built and the building moved on to it. The incubation last year was carried on in the root cellar and the results were not altogether satisfactory.

LIVE STOCK.

Three pairs of working horses and one driver have been in use, and in addition three pairs of working oxen have been employed in breaking up land, for which work

they are much better suited than horses. The registered Shorthorn stock consists of seven milch cows, four yearling heifers, three heifer calves, five bull calves, and one herd bull, making a total of twenty head. One Shorthorn bull was sold during the year. Thirty-two head of steers were fed during the winter; these were a little light for profitable feeding, and the gains on them were not great. The most of the feeds consumed by the stock has to be bought and, owing to the high price of hay and meals the margin was small.

MEETINGS ATTENDED.

Agricultural meetings were addressed at: Amherst, N.S.; Truro, N.S.; Hopewell Hill, N.B.; Hillsboro, N.B.; Salisbury, N.B.; Woodville, N.S.; Falmouth, N.S.; Mt. Denson, N.S.; Gaspereaux, N.S.; Aylesford, N.S.; Somerset, N.S.; Sussex, N.B.; Hampton, N.B.; Rexton, N.B.; Sackville, N.B.; Port Elgin, N.B.; Kentville, N.S.; Fredericton, N.B.; Grand Pré, N.S.

The meetings of the Maine State Pomological Society were attended and addresses given. The Charlottetown, P.E.I. floral show was attended in the capacity of judge, and a meeting addressed there.

BUILDINGS CONSTRUCTED.

In addition to the poultry buildings mentioned above, an implement and tool building was erected. This building is 96 feet long and 30 feet wide, with 12-foot posts and a store-room above. A steer barn with a capacity of twenty-four head, was also erected with silo and root-house attached. This building is 50 by 22 feet, with wing 12 by 12 feet for feed room and root cellar.

EXHIBITIONS.

An exhibit was put up of produce grown at Kentville, at Shubenacadie, Hants County, N.S., and Kentville, N.S. At the Kentville exhibition, in addition to the general exhibit, a display was made of the vegetables grown at this Station, and also of fruit from the experimental orchard plots illustrating the importance of different sprays.

ASSISTANTS WHO HAVE JOINED THE FORCES FOR ACTIVE SERVICE.

The station at Kentville has lost the services of Mr. J. M. Robinson, B.S.A., assistant to the Superintendent, who gave up his work in September and joined the 2nd contingent for overseas service. Mr. James Gallagher, who was gardener at the station, also at the same time joined the 2nd contingent. Mr. C. Eric Boulden, who formerly had charge of the poultry, Mr. Arthur Kelsall, who had charge of experimental orchard work, and Mr. John Brown, who was employed in horticultural work, have joined later contingents. It is needless to say that these men have been missed in carrying on the work of the Kentville Station, where they have each given highly satisfactory service.

EXPERIMENTAL STATION, FREDERICTON, N.B.

WEATHER CONDITIONS.

The winter was colder than the average, with spells of intense cold almost unprecedented. The average mean temperature for January, February, and March was 15·5 degrees against an average for the last forty years for these months of 18 degrees. There was, however, beginning December 24, a nice even blanket of snow, and frost did not penetrate as deeply as in more open winters. The snowfall was not above the average on the whole, and covered the ground till April 10. April was a cold, backward month with a below-zero record of 3·5 degrees on the 5th; cold high winds were

Field ready for Stumping, Kentville, N.S., May 1915.

16—1916—3a.

Stumps and brush piled for burning. Kentville, N.S., 1915.

frequent, and the precipitation, 4·54 inches, was nearly twice the average for the month. May continued cold and windy, with a minimum record on the 1st of 24 degrees, and frost on May 2, 5, 7, 8, 12, 13, and 29; there were, however, some warm days, since the thermometer reached 89 degrees on the 26th. There was only one-third of the normal precipitation in May, and conditions were most favourable for cultivation. Vegetation was very backward, and cold weather continued through June and up till July 22, when 44 degrees were recorded. All crops consequently made slow growth till almost August 1, and at that date such crops as corn and tomatoes were particularly unpromising. The precipitation, though not quite up to the average, was ample for the Station land and for most soils in the province, and when continued warm weather came in August and September, growth was most satisfactory, and crops eventually were very good. The average mean temperature for August, September, and October was 3 degrees higher than the average temperature for the last forty years. Harvest weather was ideal. Hay and grain were housed in splendid condition, and fine weather continued into November, so that root crops as well as others were taken from the fields in the best possible condition.

RECORD of Temperature, Precipitation and Sunshine at Fredericton for the year 1914.

Months.	Temperatures.		Mean.	Precipitation.	Hours of Bright Sunshine.
	Highest.	Lowest.			
1914	°	°	°	Inches.	
April	64	-3·5	33·6	4·54	200·9
May	89·5	24	54·9	1·095	189
June	88·5	28	58·2	4·34	262
July	88·5	40	65·2	2·595	260·5
August	85	39·5	64·8	3·73	205
September	89·5	30	59	2·78	186·8
October	77·5	12	47·7	2·775	129·71
November	57	3	30·58	2·75	98·4
December	47	-22·5	17·19	2·03	133·45
1915					
January	50·5	-28	18·83	2·71	85·8
February	46·5	-20·5	21·75	2·47	107·9
March	47·5	6·5	27·9	·62	121·35
Total				32·435	1980·81

BUILDINGS.

During the year a double cottage, two permanent poultry houses of 100-bird capacity each, and a poultry administration building with incubator basement and a brooder house were erected, and repairs made to one of the houses on the Station. As the well drilled in 1913 did not give sufficient flow for all purposes, a new well was started; unfortunately the well-boring machinery caught fire and was destroyed, burning also the coal shed and pumping station immediately adjacent. This accident necessitated a new engine for the old well, and the erection of a temporary shelter. At a depth of 900 feet no satisfactory flow of water has been found in the new well.

FENCING AND DRAINING.

Three and two-third miles of woven wire fence were erected, and preparation made for a continuation of this work.

A crew was kept steadily at work digging ditches and laying tiles. Approximately 23,000 tiles were laid, of which three-fourths were made of concrete. These are being compared with clay tile. So far as ease of handling and loss from breakage are concerned, they have thus far been more satisfactory. The drains laid in 1913 have given great satisfaction, permitting the working of the land three weeks earlier than in the years before the drainage was done.

CLEARING LAND.

Approximately 63 acres was stumped and ploughed during the season. Four and three-quarters acres of this was sown in oats, 2 acres of it planted in orchard, and 7 acres sown to buckwheat. The balance was ploughed after the seeding season, and will be put in crop in 1915. Bushes were cut and burned over 30 acres, and 20 acres of woodland was cut over and the wood sold.

ROADMAKING AND GRADING.

Twenty-five rods of the highway along the river bank was gravelled with beach gravel after several low spots had been stone-filled, and 475 loads of earth were taken off the sides of the farm road to give surface drainage from the farmyard, the earth being used to make an embankment leading to the approach to the dairy barn. The surface of the farmyard was also graded to give an even slope and surface drainage from the barns. Considerable grading on the farm road remains to be done.

LIVE STOCK.

A pure-bred Clyde mare, a grade Clyde mare, and two Percheron grade mares had foals sired by pure-bred Clyde and Percheron stallions, respectively. The pure-bred Clyde foal died from pneumonia four days after birth, and one of the Percheron foals died at three months of age from the same cause. The two remaining colts have made fairly good growth, the Clyde colt weighing on March 31, at eleven months, 860 pounds at a food cost of $32.17, and the Percheron filly weighing on the same date at ten months and twenty days, 740 pounds at a food cost of $30.26. Sires of these colts weighed 1,700 pounds, dams from 1,450 to 1,750 pounds. Ten mares were bred, but only five proved pregnant. An odd grade Clyde mare was sold and a general-purpose mare bought. The horses on hand at the end of the year were three pure-bred Clyde mares, five grade Clyde mares, two Percheron grade mares, two geldings of draught breeding, a general-purpose mare, a cross-bred standard bred Morgan driving mare, and the two colts above mentioned. Two non-pregnant mares were wintered on oat straw, hay and roots; their health was excellent, but they lost weight. The mare on turnips cost for food $3 per month, and in three months lost 115 pounds in weight; the mare on carrots cost for food $3.60 per month, and in three months lost 90 pounds in weight.

Of the thirty-nine feeding cattle mentioned in the last report, thirty-six steers were sold on May 27, after a feeding period of 141 days, at 6¾ cents and 5⅞ cents per pound according to quality. Two cows calved and were added to the dairy herd, and one cow died of blood poisoning.

Eleven heifers of no definite breeding, and typical of the average dairy stock among the farmers remote from towns, were bought for the purpose of testing their production from year to year, breeding them to good, pure-bred dairy bulls, and testing the resulting heifers to the third or fourth generation to ascertain what results can be obtained in increased production by the use solely of dairy-bred bulls. Ayrshires, Dairy Shorthorns, and Holsteins will be the bulls used.

Three small pure-bred herds of Dairy Shorthorns, Ayrshires, and Holsteins were put in and all are breeding. Two pure-bred Ayrshire calves died from pneumonia.

Thirty-six feeding cattle were bought in October, three heifers were sold for the Christmas market, two steers were slaughtered, one because of reaction to tuberculin test and one unthrifty for some undiscovered cause. Of the remaining thirty-one, twenty-five made an average gain per head of 277 pounds in the 136 days, almost exactly 2 pounds per head per day; and six dairy type steers gained 229 pounds in the 136 days, or 1⅝ pounds per head per day.

A calf feeding experiment was started March 1; sixteeen calves divided into four pens of four calves each were fed. Pen 1 was fed on whole milk, pen 2, skim-milk and a meal and oilcake mixture, pen 3, Blatchford's Calf Meal and water, Pen 4, Blatchford's Calf Meal and skim-milk. The gain averaged approximately 50 pounds per head for the month in all pens but No. 3, which was only 27 pounds. The cost per pound of gain on whole milk was 7·7 cents, on skim-milk and meal mixture 2·8 cents, on Blatchford's Calf Meal and skim-milk 5 cents, and on Blatchford's Calf Meal alone 8·3 cents. This experiment will be continued to June 1.

Eighteen young pigs were put in temporary quarters on September 15 at from three to four weeks old to utilize dairy waste and unmarketable potatoes. They dressed 80 pounds on the average December 30, after 3½ months' feeding and at about 4½ months of age.

POULTRY.

The year was started with four small flocks of thirty Barred Plymouth Rocks, thirteen White Wyandottes, twenty-one Rhode Island Reds, and nineteen White Leghorns. The plant consisted of three colony houses, two incubators of 250-egg capacity each and one of 120 eggs, and two out-door brooders. One hundred and nine chicks were successfully incubated and reared in April, and 136 in May. Care was taken to incubate eggs from the best laying hens, and a number of fine birds resulted. During the summer, two permanent houses to accommodate 100 hens each were erected, and later a poultry administration building with incubator cellar. In this was placed a 1,200-egg incubator. A brooder house was later built and a coal-heated brooder installed. During the summer, autumn, and early winter, a number of both old and young birds were sold for breeding purposes and for table use. The winter was entered upon with 296 birds of all kinds; 45 additional pullets were purchased in December, giving 270 hens and pullets in all. These birds laid during January, February, and March, 5,914 eggs, some individual birds making exceedingly good records and some very poor. Care is being taken to select for hatching only well-formed, perfect-shelled eggs from the best laying hens.

APIARY.

On June 9 an apiary was started with five colonies of black bees in eight-frame Langstroth hives. The season was cold and backward, consequently they did not do as well as might be expected in a normal season.

No. 4 hive threw a swarm on July 20, and No. 5 on July 28. These were hived in eight-frame Langstroth hives. On September 9 the queens in these hives were destroyed and a day later imported Italian queens were successfully introduced by the smoke method.

The principal honey plants in this district are alsike, apple, aster, buckwheat, dandelion, fireweed, goldenrod, harebell, and wild raspberry.

The total production of honey for the season was 147 pounds extracted, and 59 sections.

CROPS.

Thirty-five acres of newly cleared land was sown to oats between May 23 and May 30. The yield per acre was from $25\frac{3}{4}$ acres, $22\frac{2}{3}$ bushels; from $4\frac{3}{4}$ acres, 42 bushels of New Market; and from $4\frac{1}{2}$ acres, 49 bushels Banner. As this land had only been ploughed once it was very rough and uneven in quality, and the seed had to be sown broadcast. A portion of the crop could not be gathered for threshing because of so many small roots on the ground. Weather conditions during June and July were so unfavourable that the crop did not get fairly started until August; no fertilizer of any kind was used.

Buckwheat was sown on $7\frac{1}{2}$ acres of newly cleared land. All conditions were unfavourable to growth, and the yield was only 18 bushels per acre.

Eight acres of turnips yielded at the rate of 940 bushels per acre at a labour cost of 4·98 cents per bushel, and 7,295 roots of the Kangaroo variety were stored for seed production in 1915. Three varieties of sugar beets yielded from 410 to 484 bushels per acre, and five varieties of white carrots from 411 to 725 bushels per acre. Fourteen acres of corn yielded an average of 9 tons per acre of fairly well-eared stalks, and the labour cost of growing the corn and putting it in the silo was $2.94 per ton.

Ten and three-tenths acres of potatoes were grown. Four and one-third acres, on land without fertilizer either with the crop, or for many years previously, yielded 209 bushels per acre. Leaving out land unfertilized, the average yield per acre for the crop was 272 bushels. The surplus of the crop was shipped from the field direct to dealers in Saskatoon.

Hay from old sod, of which there were 40 acres cut over, yielded 1 ton per acre. Ten acres of newly-seeded clover under rather unfavourable conditions gave $1\frac{1}{4}$ tons per acre. Two small patches of alfalfa were seeded in July. The ground was limed, the seed inoculated, and a good stand secured. Peas and oats were sown for soiling crops on ground full of mustard. The growth of mustard was sprayed three times with bluestone solution, and thus partially kept under. The crop was all cut before any of the mustard could ripen seed.

HORTICULTURE.

Seventeen acres was devoted to horticulture, as follows: Old orchard, 2 acres; new orchard, 11 acres; small fruits, vegetables, flowers, and nursery, 4 acres. Six hundred and six apple, twenty-seven pear, one hundred plum, and sixty-nine cherry trees were set. A large number of varieties of raspberries, currants, gooseberries, strawberries, rhubarb, and grapes were planted, and considerable additions made to the nursery. A perennial border, 560 feet long, was established, and a large variety of roses and annual flowers also grown. Variety and fertilizer tests were made with vegetables, including 152 varieties of potatoes.

Seed plots of leading varieties of potatoes were hill-selected at harvest. The average weight of the largest hills, according to variety, varied from $2\frac{9}{10}$ pounds to $5\frac{1}{2}$ pounds, and that of the small hills from $\frac{9}{10}$ pounds to $3\frac{3}{4}$ pounds according to variety. Sixty-five hills of "Wee McGregor" potatoes averaging $5\frac{1}{2}$ pounds each in rows 30 inches apart and hills 12 inches apart in the rows yielded at the rate of 1,603 bushels per acre, while 353 hills of the same variety at the same distances averaging 1 pound each, yielded only 290 bushels per acre, evidencing the possibilities of seed selection and intensive cultivation. In the tests of 152 different varieties of potatoes, thirty yielded at the rate of over 400 bushels per acre, the highest being 510 bushels.

FERTILIZER EXPERIMENTS.

Tests as to the relative values of nitrate of soda *versus* fish scrap, and basic slag *versus* acid phosphate were made in the growing of potatoes. Nitrate of soda gave 16 bushels more per acre than fish scrap, and basic slag gave 8 bushels more per acre

than acid phosphate. In using different quantities of the same fertilizer per acre, 500 pounds of a 4-8-10 mixture gave 291 bushels per acre, while 1,000 pounds of the same gave 311 bushels per acre, the gain in yield being only 20 bushels per acre worth, at 40 cents per bushel, $8, while the extra 500 pounds fertilizer cost approximately $10. The check plots on which there was no fertilizer gave 155 bushels per acre.

In testing the amount of potash used per acre it was found that the results were practically the same as last season; 6 per cent potash giving 305 bushels per acre; 10 per cent, 274 bushels; three per cent, 254 bushels; and no fertilizer, 171 bushels. Some striking results were obtained as to the economy of using a combination of fertilizer and light manuring *versus* heavy manuring in the growing of vegetables. In nearly every instance, much money was saved by using 15 tons of manure and a few hundred pounds of soluble fertilizer per acre against 30 tons of manure and no fertilizer.

MEETINGS AND ADDRESSES.

The arrangements for meetings on behalf of "Patriotism and Production" in New Brunswick were placed in the hands of the Superintendent. In this work he had the hearty co-operation of the Provincial Department of Agriculture, the officials of which took charge of the advertising of these meetings and the supplying of some of the speakers. The Superintendent attended and addressed nine of these meetings and attended the meetings of the Farmers' and Dairymen's Association, taking part in some of the discussions. Cattle were furnished for the judging work at the Agricultural School at Woodstock, and horses and cattle provided for the Farmers' and Dairymen's Association judging demonstrations.

Addresses were given at the agricultural school at Woodstock and at the Florenceville Seed Fair.

Visits were made to the Station during the year by the delegates to the New Brunswick Women's Institute Convention at Fredericton, by the members of the Farmers' and Dairymen's Association, and by the members of the New Brunswick legislature.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

The winter of 1913-14 was cold and dry, with little snow, which disappeared during the last days of March, although the soil remained frozen until the last of April.

Seeding commenced on May 9, but was not finished until the 31st, owing to rainy weather. During the latter part of June and throughout July extreme drought prevailed; this reduced the hay crops to much below the average yield.

CULTURAL WORK.

Destroying Couch Grass.—An experiment in bare summer-fallowing throughout the season, compared with good cultivation until June and then sowing a smother crop was carried on. The results this year did not favour the use of the smother crop. The bare summer-fallowing destroyed the couch grass only to the same degree as did disc-harrowing in the neighbouring field.

Methods of weed eradiction will continue to receive attention, along with the study of soil cultivation and rotation of crops.

HORSES.

At this Station we have one driving horse and five working teams. Two of these teams were purchased during the summer to meet the increase of work due to the enlargement of the Station.

An experiment in the economical wintering of horses was carried on. These were given light work and were fed on a ration of hay and oat straw. They remained in good health during the winter. They consumed slightly less than 1 pound per day of each of the above feeds per 100 pounds of live weight. The weights of the horses at the beginning and end of the test showed that they lost 2 and 2½ per cent, respectively.

CATTLE.

There are at this Station a good bull and twelve cows, registered Ayrshires, and seven calves of the same kind. There are also six bull calves, which may be sold for breeding purposes.

Six young grade cows were bought in May to carry on an experiment in grading up by the use of a pure-bred bull. These were obtained from the ordinary herds of the districts, and probably represent the average as milk producers. They were chosen for variety of colour and conformation with the view of showing the advantage of continued crossing with a pure-bred sire for improving milk production, and uniformity of colour and conformation.

SWINE.

There are at present on the Station a good Yorkshire boar and two sows of that breed as foundation stock.

BEES.

Thirteen hives wintered well in a dry and well-ventilated cellar. The Station apiary has attracted much attention from visitors who had an opportunity to observe the bees at work in a glass-fronted hive. The honey flow was abundant and of good quality.

EXPERIMENTS WITH CEREALS.

Not yet having land suitable for extensive tests of cereals, the work was confined to trials of the following: Wheat, Marquis and Huron; barley, Success and Manchurian; oats, Ligowo and Daubeney; and the Arthur variety of peas. These were tested in small plots in the young orchard planted in 1910. More extensive trials will be carried on as soon as the land to be used for the purpose can be prepared and drained.

HORTICULTURE.

Four hundred and eighty-six fruit trees were planted in the spring, including 318 apple, 108 plum, 40 cherry, and 19 pear trees. Many of the varieties represented had not previously been tried in this district.

Three hundred and twenty specimens of small fruits were planted in the new orchard. Two hundred and twenty-four varieties of vegetables were tested.

IMPROVEMENTS TO THE STATION.

Considerable work of this nature was done during the year, chiefly by removing stones and putting up fencing, etc. More than 900 rods of wire fencing were put up. The posts were all painted, and those along the road were turned. The stones removed were used for masonry, for paving the barnyard, and for foundation for the farm roads.

Buildings.—An old uninhabitable house was reconstructed so as to furnish two good dwellings, with stone foundations. A house for the farm scales was built.

DRAINAGE.

More than 18,000 feet of tile were laid in the fields, and 600 feet were used to complete the drainage of the barnyard, which was paved with stone and gravel during the summer. The yard is now firm and dry.

An approach to the new barn was also built. The sides of this approach are of stone, 3 feet thick, built on a deep foundation of large rocks and cement.

Cement platforms were built at the main entrances of the cow stable and the horse stable. The above, with the improvements made to the public roads, have done much to improve the appearance of the Station.

EXHIBITIONS.

Exhibits were made at Three Rivers and Quebec, of the products of the Station in fruits, vegetables, honey, etc. At Three Rivers the Station was awarded a diploma for the best exhibit of pure honey, and one for the best exhibit of vegetables. At Quebec a diploma was received for the best exhibit of vegetables, and the gold medal for the best exhibit of fruits and pure honey.

VISITORS.

These numbered 1,936 during the year, besides visits made by the Dairy Commissioner and his officers of this district, also by the professors and students of the Ste. Anne College of Agriculture.

VISITS MADE.

The Superintendent examined forty-six fields in the district, and gave practical demonstrations of cultural methods. He installed the Station exhibits at Three Rivers and Quebec, and judged at the L'Islet County Horticultural Show. He was present at the conference of agricultural missionaries at Ottawa, and later attended the conference of superintendents there. He also assisted the Superintendents at Lennoxville at a series of meetings in the counties of Compton and Wolfe.

METEOROLOGICAL OBSERVATIONS.

Month.	Temperature F.					Precipitation.					Hours of Sunshine.
	Date.	Maximum.	Date.	Minimum.	Mean.	Rainfall.	Snowfall.	Total	Number of Days.		
									Rain.	Snow.	
1914.		°		°	°	In.	In.	In.			
April	20	61·0	12	6·2	31·3	·54	5½	1·09	5	3	174·6
May	20	80·4	1	22·0	53·4	3·18	1	3·28	13	1	241·4
June	25	81·4	2	32·4	56·8	·92	......	·92	15	....	235·6
July	14	91·4	29	37·2	63·6	·64	......	·64	2	....	288·2
August	10	89·4	22	34·6	60·0	1·04	......	1·04	5	....	238·8
September	21	82·4	30	31·8	50·5	2·34	......	2·34	7	....	178·6
October	2	66·2	28	30·0	47·2	3·46	1½	3·61	11	1	112·8
November	30	47·0	19	2·0	24·4	1·19	8	1·99	5	7	80·8
December	2	45·0	24	—24·2	9·6	·24	6½	·89	11	5	103·0
1915.											
January	7	47·3	31	—18·8	16·2	·92	7	1·62	3	5	78·4
February	16	39·5	2	—16·3	17·7	2·38	13	3·68	3	5	81·8
March	25	43·7	8	2·6	22·6	·10	7	·80	1	3	140·8
Total	......	....	......	....	....	16·95	49½	21·90	81	30	1·955·0

NOTE.—10 inches of snow are taken as equivalent to 1 inch of rainfall.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

CHARACTER OF SEASON.

Spring was about an average one for earliness. The last frost occurred on May 17, when 29·2° F. was registered. A drought which lasted all through July until August 11 cut down the yield of hay and the stock-carrying capacity of pastures very much; it also hurt carrots, mangels, sugar beets, vegetables, all herbaceous flowering plants, raspberries and strawberries, whilst corn for silage, swedes, fruit trees, gooseberries, currants, ornamental trees and shrubs did not suffer. Early sown grain pulled through very well. The first frost was on September 29, when the thermometer went down to 27·2° F.,; this was fourteen days later than in 1913. The lowest temperature was on February 11,—30·7° F., and the highest, exactly six months later, on August 11, 92° F.

LIVE STOCK.

All the live stock kept in good condition during the year.

HORSES.

At the beginning of the year, there were nineteen horses: fourteen registered French Canadians—nine mares, two 2-year-old fillies, one yearling stallion, two weanlings—also two teams of from 2,600 to 2,900 pounds and one driver. These horses are kept for work, experimental feeding, experimental housing, and to sell high-class breeders at a reasonable figure.

Work.—During the twelve months each horse averaged over 200 full days' work of ten hours.

Experimental feeding—Wintering an idle horse at low cost—By feeding 1 pound each of rough hay, oat straw, and roots per hundred pounds live weight, an 11-year-old mare, weighing 1,055 pounds on November 1, 1914, was kept for $13.64 until March 31, 1915, when she tipped the scales at 1,100 pounds. This experiment has now been made four years in succession, and the average cost, for 151 days, has been $14.33, with a gain in weight of 37 pounds for each horse.

Cost of raising horses.—All the feed given to a young stallion, from the time he was weaned until he was 22 months old was weighed and amounted to $90.69, at the following valuations: hay, $7 per ton; oats, 1½ cent per pound; bran, 1 cent per pound; pasture $1 per month. The average weight of the sire and dam of this colt is 1,075. and this is exactly what the youngster weighed at 22 months, which shows that, when matured, he will probably tip the scales at 150 to 200 pounds more than his parents. Two weanlings were kept until the March 31 following their birth for 18 cents each per day.

Experimental housing.—During the last three winters, five different colts have been kept outside, with only a single-board shed for a shelter, and the temperature went down as low as —31° F. They never even shivered, and though it may have taken more food to keep up the necessary warmth, they have kept in splendid health.

CATTLE.

The herd now comprises twenty-nine head of pure-bred and ten grade French Canadians: four bulls aged 8 months to 6 years, eighteen cows, thirteen heifers, four heifer calves. These cattle are kept for milk production, experimental feeding, experimental breeding, and to sell stock at reasonable prices.

Milk production.—Thirteen cows, aged 3 to 11 years, averaged 7,316 pounds of milk and 350 pounds of butter, which is 1,810 pounds of milk and 59 pounds of butter more

per cow than the average for the herd in 1913. Weeding out the low producers was the main cause of the increase. Calculating hay at $7 per ton, roots and silage at $2 per ton, meal at 1¼ cent per pound, pasture at $1 per month, it cost 87 cents to produce 100 pounds of milk, and eighteen cents to produce a pound of butter. With the latter at 28 cents per pound and skim milk at 20 cents per hundredweight, the cows gave an average profit of $48.74 over cost of feed. An interesting fact is that the best six gave a profit of 104 per cent over cost of feed, whilst the seven others only gave a profit of 54 per cent. It would probably pay to weed again next year.

Experimental feeding—Best quantities of meal to feed.—In 1913 and in 1914, fifteen cows were used for an experiment which lasted over 300 days altogether. These cows were a fairly uniform group as to weight, production, time elapsed since calving, and they were all fed the same quantities of roughage. A certain number received as much meal as they would eat, which was 1 pound per 2·25 to 2·5 pounds of milk; the next lot got 1 pound of meal per 4 pounds of milk; whilst the last lot were given 1 pound of meal per 8 pounds of milk. Partitions were put in between cows, in the mangers, so that no one could be robbed by her neighbours, and sawdust was used as bedding so that no straw could be eaten. The lot which received an unlimited quantity of meal averaged the most profit.

Cost of raising heifers.—It is the intention to find out exactly the cost of feed necessary to raise a heifer until she is in milk. All the feed given to three calves was weighed, and it cost $23.18 to bring each of them to 6 months, when their average weight was 361 pounds. Hay was valued at $7 per ton, roots at $2 per ton, meal at 1¼ cents per pound, whole milk at 1½ cents per pound, and skim-milk at 20 cents per hundred weight. It is probable that the cost can be decreased by feeding less whole milk and more skim-milk, and this will be tried another year.

Selling breeding stock at a reasonable price.—Nine cows have now qualified for Record of Performance, and none will be kept that cannot do the same thing.

SHEEP.

There are seventeen pure-bred Leicesters: one ram and sixteen ewes: five aged, seven shearlings, and four lambs.

POULTRY.

One breed only is kept, Barred Rocks. About 150 hens and pullets were wintered. A good building, comprising incubator, egg, killing, and feed rooms and a granary, was built; also a 32 foot by 16 foot permanent house for 100 hens, and three colony houses 12 feet by 8 feet.

BEES.

Sixteen colonies were put in the cellar of the Superintendent's house in the autumn of 1914. The average production of honey was 37 pounds per hive.

FIELD HUSBANDRY.

Work under this head comprises comparison of different rotations, cost of producing field crops, rates of seeding corn for silage, oats for grain, timothy and clover for hay, yield of hay with oats as a nurse crop sown at different rates, and yield of hay with different nurse crops.

ROTATIONS.

Three rotations have been compared: (1) Three-year, swedes, oats, clover; (2) four-year, swedes, oats, clover, timothy; (3) six-year, swedes, oats, hay, hay, hay, hay. In four years from 1911 to 1914, inclusive, the returns per acre increased 42 per cent

for the three-year rotation, 83 per cent for the four-year, and 30 per cent for the six-year. Though the relative increases may change with time, it is evident from these figures that proper rotation of crops pays.

COST OF PRODUCING FIELD CROPS.

Accurate records were kept of the cost of production of three of the main crops of the district: swedes, oats, and hay, on 13 acres of land, in 1914: a ton of swedes was produced for $2.18, a bushel of oats for 33 cents, and a ton of hay for $5.86.

RATES OF SEEDING CORN FOR SILAGE.

All corn grown on 39·46 acres since 1911, inclusive, was weighed. When sown in rows 48 inches apart and 8 inches in the row, it averaged 11·58 tons per acre; in rows 42 inches, 10·76 tons per acre; in hills 42 inches in all directions, 5·52 tons per acre; in hills 36 inches, 5 tons per acre. The average yield per acre, for the whole thing, was 8·32 tons.

CEREALS.

Work with cereals consists in trial of varieties, growing for sale or distribution the varieties which are best adapted to this district, and selection of the highest yielding strains by the head-row method.

TRIAL OF VARIETIES.

Four varieties of spring wheat, six of oats, three of six-row barley, and four of peas were tried on triplicate plots of one-sixtieth acre each. The results of four years show that the best varieties for this district are Huron wheat, Banner oats, Manchurian and Arthur peas.

FORAGE CROPS.

With forage crops, the work consists in variety tests, seed growing for sale or distribution, and selection of best strains as regards yield, hardiness, and composition.

VARIETY TESTS.

Nine varieties of Indian corn, five of carrots, eleven of mangels, four of sugar beets, and thirteen of swedes were tried on duplicate plots of one-hundredth acre each. The results of four years show that the following varieties may be recommended: corn for silage, Longfellow; carrots, Improved Short White; mangels, Yellow Intermediate; sugar beets, Vilmorin A; swedes, Good Luck.

SEED GROWING.

Seed has been grown of Good Luck swedes, and steps have been taken to grow seed of the best varieties of carrots, mangels, sugar beets, and Indian corn.

HORTICULTURE.

Work in this department is divided into fruit, ornamental gardening, and vegetables. It consists in testing varieties for earliness, yield, quality, hardiness, beauty, in cultural experiments, and in the propagation of the best kinds.

There are 1,118 apple trees of 122 varieties, 132 plum trees of 42 varieties, 50 cherry trees of 14 varieties, 11 pear trees of 4 varieties, and a number of the best kinds of grapes, currants, gooseberries, and strawberries.

Notes were taken of 1,401 varieties of ornamental plants: 269 annuals, 478 perennials, and 654 trees and shrubs.

Three hundred and four varieties or strains of vegetables were on trial, including twenty-two varieties of potatoes.

CULTURAL EXPERIMENTS.

These have been started in the orchards, to compare clover, rape, and vetches as a cover crop, also to compare these with clover followed by rape, and with permanent sod where the hay will be left on the ground for one part and taken off for the other. With vegetables, work will be undertaken to find out the best distances to thin, methods of blanching celery, of staking and pruning tomatoes, of controlling maggots, of starting onions, of forcing rhubarb, of treating potato tubers, etc.

FARM DEVELOPMENTS.

Many improvements were made during the year, the principal of which were a good system of waterworks and the macadamizing of 14 arpents of road fronting the farm. In buildings there were erected a poultry administration building, 18 feet by 26 feet, 2½ stories, and three colony houses 12 feet by 8 feet, whilst an implement shed, 80 feet by 25 feet, was moved next to the workshop. Nothing was done in fences, a few minor repairs only being made. About 10,000 feet of drains were put in, and a large open ditch dug, about half a mile long, to take away surface water coming from adjoining properties. Some 10 acres of land were cleared.

EXHIBITIONS.

Corn, roots, grain, vegetables, fruit, flowers, and honey were exhibited at Three Rivers and at Quebec, whilst a few things were sent to Sherbrooke. Ten horses and twenty head of cattle, all French Canadians, were shown at Quebec and at Sherbrooke. Every effort was made to bring out forcibly the educational side of the display, and competent men were in charge, glad to give visitors all reasonable information.

Some Weather Observations taken at Cap Rouge, 1913.

	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hrs.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
1914.								
April	54	6·2	30·12	1·19	6·8	1·87	·70	145·1
May	86	26·2	52·7	1·56	....	1·56	·50	239·7
June	86	32·2	56·36	3·28	....	3·28	·71	223·0
July	89	45·2	64·5	1·66	....	1·66	·58	279·8
August	92	40·2	61·9	4·43	....	4·43	·73	218·1
September	84	27·2	55·8	4·92	....	4·92	1·13	175·5
October	69	24·2	44·4	5·24	1·4	5·38	1·59	108·0
November	52	—1·1	25·39	2·62	23·1	4·93	1·18	53·9
December	44	—22·8	13·7	·68	19·2	2·60	·50	76·3
1915								
January	45	—21·8	12·75	1·18	16·60	2·84	·50	52·9
February	34	—14·9	16·37	1·80	17·0	3·50	·70	78·2
March	40	5·2	22·3	....	3·20	0·32	·24	136·7
				28·56	87·30	37·29		1,787·2

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

The land for this Experimental Station was purchased in the fall of 1913 and was taken over by the Department of Agriculture on April 1, 1914. It comprises an area of approximately 436 acres, 320⅔ acres in the township of Ascot, and the remaining 115⅓ acres in the corporation of the town of Lennoxville. The centre of the farm is about 1 mile from the centre of the town, one of the most central points in the nine counties comprising the Eastern Townships of the province of Quebec, which this farm is supposed to serve. Lennoxville has a population of 1,300, is located on the main line of the Canadian Pacific, Grand Trunk, Boston and Maine, and Quebec Central railways, which gives it the best railway facilities of any place in the Eastern Townships. It is also connected by electric car service, every fifteen minutes, with the city of Sherbrooke, the principal city in the Eastern Townships, which is only 3 miles distant and has a population of 19,000. To complete the description it may be stated that this farm is situated 104 miles east of Montreal, 28 miles north of the boundary line of Vermont, and is in latitude 45° 20′ north and longitude 79° 49′ west, with an altitude of 500 feet.

THE FARM.

The farm is made up of different areas purchased from the following gentlemen:—

R. W. Reid	168½	acres.
W. H. Pearson	150	"
E. Reed	108	"
W. J. Douglas	6½	"
H. Bennett	2¼	"
C. F. Carter	¾	"

making a total of 436 acres.

This farm is bounded on the north by the St. Francis river and the Cookshire road, on the east by divisional lines, on the south by the Canadian Pacific railway and divisional lines, and on the west by Bishop's College property. The surface of the farm near the river bottom is quite level, with undulating fields rising towards the south and east and from the high parts of which a magnificent view of the St. Francis valley and the town of Lennoxville may be obtained.

THE SOIL.

The soil near the river bottom is a clay loam, and 23,000 feet of tile was laid in these low-lying fields this past season. The soil of the fields rising from these flats is more of a sandy loam and is, of course, on that account well adapted for most crops. The land at the back of the farm is quite rough, never having been broken, and will be used for sheep pasturage until such time as it can be worked over and got into proper shape for crop production. There is approximately 20 acres of bush on the farm.

FIELD WORK.

When this Station was organized by the Dominion Department of Agriculture, April 1, 1914, the first work was drawing three carloads of fence posts from the station for the erection of farm fences. This was followed by drawing manure shipped from Montreal, which was applied to 25 acres of old timothy sod in very poor condition, but on which it was desired to grow corn in 1914. Breaking this sod began May 1, followed with a rolling to pack solid and conserve moisture: a little later discing was commenced with a double cutaway disc, on which were used four horses, followed by a 20-foot smoothing harrow, which put the soil into fine tilth. Corn planting was commenced on the 28th, Wisconsin No. 7 and Longfellow being the varieties used, sown in check rows 36 inches apart each way. A smoothing harrow was used until the corn

was well through the ground when a two-row riding cultivator was kept going as long as a team could work through, after which a one-horse cultivator was used for one cultivation. When this crop was cut in September it was found to be well eared and yielded a good tonnage. A 20-horsepower steam engine and large Blizzard blower were used to fill the silos. Considering the poor condition of the soil and the quality of manure used, the crop secured demonstrated very conclusively that the district is well adapted to the raising of this important crop. There was also sown on land ploughed in the fall of 1913 for former owners, 49 acres of Banner oats, and 10 acres of two-row or duckbill barley. Thirty-four acres of this 59 were seeded down to timothy and red clover at the rate of 10 pounds of each per acre. The grain was harvested in the latter part of August but had to stand in the shocks for some time on account of rainy weather. When dry it was drawn from the shocks and threshed at once, yielding approximately 45 bushels of oats and 36 bushels of barley per acre.

FENCING.

Fencing was commenced in the month of September on the north boundary of the farm, and was continued around the farm a distance of 4½ miles, using a 4-foot woven fence, nine strands, No. 9 galvanized wire, with stays 16 inches apart, posts set 16 feet apart, 3 feet deep with corner and brace posts 4 feet deep, well braced and anchored. Some divisional fences were also completed.

ROADS.

The main travelled thoroughfare through the farm is the Cookshire-Eaton road, which is the outlet of a large farming district in the counties of Compton and Wolfe to the city of Sherbrooke.

DRAINAGE.

Twenty-three thousand feet of tile were laid this past season according to plans and specifications drawn up by the Field Husbandry Division of the Central Experimental Farm, Ottawa. There was also 1½ miles of open ditch opened up, 6 feet at top tapering to 2½ at bottom, 3 feet deep.

BUILDINGS.

There are six houses on this property, three of which have been painted, papered, fitted throughout with hot and cold water, and electric lights installed. One of these is occupied by the Superintendent, one by the foreman, and the other is used as a boarding house.

The barns used are those which were on the different properties when taken over, very little outlay being put on them, in expectation of new buildings being built soon. The horse stable which was on the property formerly owned by R. W. Reid includes space for twelve horses and a harness room, and is used for that purpose; the balance of the horses, six in number, are stabled in the R. W. Reid barn, the remainder of said barn being used for beef steers and sheep. The barn on the property formerly owned by E. Reed is also used for cattle.

SILOS.

Two stave silos were erected this past summer, 18 feet in diameter, 30 feet high, with a capacity of 320 tons.

WATER SUPPLY.

Water for use at the Superintendent's, foreman's and boarding houses, also the barns on the R. W. Reid property, is furnished from a driven well 16 feet deep which is connected up to a Heller-Aller compressed air tank system, the pump being run by electric current.

LIVE STOCK.

Horses.— There are now at this Station three imported registered Clydesdale mares, three Canadian-bred registered Clydesdale mares, ten other well-graded Clydesdale work horses, one driving horse, and one registered foal dropped on September 1, 1914.

Cattle.—Seventy-eight beef steers were fed at the Station this past winter. Forty-eight of these were sold on March 30, the balance are still on hand and will be ready for market the first of May. These cattle were fed on corn silage, hay, and concentrates consisting of bran, barley, cotton seed and oilcake meal.

There were also two different feeding experiments carried on, the results of which will be found in the Dominion Animal Husbandman's report.

Sheep.—Fifty-four common grade ewes of different breeds were purchased locally from different farmers, with the object of experimenting in the eradication of weeds, such as the orange hawk weed, better known in the Townships as the paint-brush, ox-eye daisy, etc., with which the rough pasture land in this section is badly infested. It is also proposed to carry on a grading experiment with this flock by using the best registered rams of some particular breed, probably Oxford, for a number of years, and the selection of the best ewe lambs for breeding purposes with a view to demonstrating to the farmers the improvement that can be made in their flocks by working along such lines. The quality and quantity of wool, and the weight of the sheep and lambs will be taken into consideration each year.

HORTICULTURE.

One of the first things done at the opening of this farm was the planting out of a nursery of ornamental trees and shrubs for future use. These have done very well through the summer and after this season a report on their hardiness can be made. There have also been set out twenty-six varieties of strawberries, which will be ready for permanent plantation this spring.

VEGETABLES.

Tomatoes.—One-half acre of tomato plants of different strains, bred at the Central Experimental Farm and sent to be tested out for earliness and productiveness was set out. Alacrity-Ponderosa was found to be a very prolific variety, with Alacrity-Dwarf Stone not far behind, being a very abundant bearer and with fruits almost free from roughness.

Corn.—Fifty-four varieties of sweet corn were planted June 5. The season not being very good for corn, most of these varieties did not mature sufficiently for use. It was found that Early Dawn was the earliest and of a very good quality, Malcolm next, and Malakoff not far behind.

Potatoes.—Six different varieties of potatoes were planted for hill selection. These were Carman, Empire State, Early Ohio, Green Mountain, Irish Cobbler and Gold Coin. Of these varieties a selection of one hundred hills of each was made, and also one hundred hills as they came in rows. It was found that some of the varieties of selected hills produced 100 per cent more than the unselected.

FLOWERS.

Several varieties of perennial flower seeds were planted July 16, and these will be used for perennial borders later on. They came on very well, were transplanted into beds, and many of them were in bloom before winter set in. There is also a collection of narcissi, tulips, and hyacinths in the ground ready for flowering this spring.

GENERAL WORK.

Through the winter months hot-bed frames were made, sashes painted and glazed, stakes labelled for orchards and vegetables, and all other preparatory work completed.

Ten acres for cultural orchard, 8 acres for variety orchard, vineyard and other small fruits which will be planted this spring, were set aside.

EXHIBITIONS.

There was shown from this Station, in conjunction with the Central Experimental Farm exhibit at Canada's Great Eastern Exhibition held at Sherbrooke in September last, a small exhibit, consisting of vegetables of different varieties, field corn, flowers, grasses, and grains.

MEETINGS.

During the months of February and March, the Superintendent attended thirty-four meetings in the different counties comprising the Eastern Townships in connection with the Patriotism and Production campaign. Much assistance was given in these meetings by the staff of the Central Experimental Farm, Dominion Department of Agriculture, and the Commission of Conservation, Ottawa. These meetings gave the Superintendent a good opportunity of studying the conditions in the different sections and of getting in touch with the farmers, who appeared to be very anxious to gain any information possible along agricultural lines.

MISCELLANEOUS.

Visitors.—Although this farm has been in existence only since April 1, 1914, many visitors from the different sections of the Eastern Townships have taken the opportunity of visiting it.

EXPERIMENTAL FARM, BRANDON, MAN.

The season of 1914 at Brandon began rather favourably, and until July 1, crop conditions were good. However, a period of extreme heat with drought and high winds set in during June and continued throughout July and into the month of August. This brought on extremely early maturity of crops and consequent shrinkage of yield. Harvesting was completed by August 13 on this Farm, or about the time that it usually begins. Grain crops were about two-thirds to three-quarters of a normal yield, and all other crops suffered proportionately.

TESTS OF CEREALS.

The usual tests of varieties of cereal grain crops were conducted on uniform duplicate plots. Marquis wheat, as usual, excelled all other varieties. Its advantage over Red Fife was greater than usual this year as the Red Fife, being later, suffered much more severely in the hot winds. The five-year averages for these two varieties are: Marquis, 42 bushels, 36 pounds per acre; Red Fife, 37 bushels 23 pounds per acre. In oats, some of the earliest varieties gave best results this year on account of the dry weather, but the Banner variety makes the best showing on the five-year average. The varieties of barley that are giving best results are: Manchurian, Garton's No. 68, and O. A. C. No. 21. Of nine varieties of peas grown, Arthur is considered the most desirable on account of its earliness. Three varieties of flax obtained from the North Dakota Agricultural College have done very well; N. D. R. 52 has given the best two-year average.

FIELD HUSBANDRY.

The work with crop rotations is one of the most important being conducted on this Farm. Eight rotations, occupying more than half the land on the Farm, are being tried out. They include a straight grain-growing rotation various stages of the development of mixed farming, and various arrangements of crops in the mixed-farming system. Very satisfactory results are being obtained, showing conclusively that greater returns are possible from a diversified, balanced system of farming than can be obtained from growing grain only.

The extensive system of cultural experiments inaugurated in 1911 has been continued, and a large mass of figures is being collected which it is hoped will give valuable information in regard to the best methods of soil cultivation. Among the lines of investigation being followed are: depth of ploughing, methods of handling summer-fallow, methods of handling stubble land, breaking sod, seeding down, applying manure, green manuring, preparation of seed-bed, soil packers, depth of seed, fertilizers and drainage.

FORAGE CROPS.

Experiments with different varieties of grasses, alfalfa, clovers, and mixtures of the same, gave very interesting results. Alfalfa shows itself to be decidedly the most productive forage crop, whether alone or in mixtures. Western Rye grass also gave good results. Experiments with crops that may be used for growing hay the same season as sown, showed oats to be the best, considering both yield and palatability. Hairy vetch also gave good results for this purpose.

Seventeen varieties of Indian corn were tested. The yield of fodder was less than usual, but six varieties produced ripe grain. Among the best varieties of fodder corn for Manitoba are: Northwestern Dent, Longfellow, Minnesota No. 13, and North Dakota White. Fourteen varieties of turnips, thirteen of mangels, and five of field carrots were tested.

HORTICULTURE.

The usual tests of a large number of varieties of vegetables were made, and are reported in detail in the horticultural report. The season was very unfavourable for most kinds of vegetables, but by means of thorough cultivation, good yields were obtained. Notes were taken on the appearance and table quality of the vegetables, as well as the yield and date of being ready for use.

A good crop of apples was harvested from many of the cross-bred trees originated by the late Dr. Wm. Saunders, and from seedlings of these cross-breds. Some few standard apples were grown, but not in commercial quantities. An effort is being made to originate a hardy standard apple through the use of large numbers of seedlings of the hardiest kinds obtainable. Over ten thousand of these seedlings are now being grown.

The plum crop was hardly up to average, and yet quite a large quantity of plums of selected native strain was grown. This type of plum is found to be the best.

Tests of varieties of strawberries, currants, gooseberries, and raspberries are being conducted and the hardiest varieties being determined. Good results are being obtained.

The display of flowers was the poorest in many years. The heat and shortage of water were the cause. However, even under these circumstances, the flowers were fairly attractive and some valuable information was obtained as to the most drought-resistant varieties. Perennials did well despite the dry weather. The trees and hedges form a constant demonstration of the possibilities of the country, and as to the proper kinds to use.

LIVE STOCK.

The cattle kept on this Farm are Shorthorns of the dual-purpose type. Some of them are proving very satisfactory milkers. One has made an official Record of Performance record of 12,655 pounds in one year. Records have been kept of the feed used by each animal, and as a result data are available as to the cost of milk production and the raising of young cattle.

An experiment in steer-feeding in which corn ensilage was compared with dry corn fodder was completed in the spring of 1914. The result was strong evidence in favour of the use of silos for the storage of corn. The experiment which is being conducted this winter, 1914-15, is a comparison of corn silage and straw *versus* alfalfa hay *versus* mixed grass hay, and also outdoor feeding *versus* stabling. The experiment is not completed.

The flock of breeding ewes has been utilized for an experiment in comparing alfalfa *versus* mixed hay, and also wintering in a rather expensive sheep barn *versus* an open shed. The alfalfa gave best results as a feed, and no great difference could be observed as a result of the difference in shelter. Data on the cost of feeding sheep are also being collected.

An experiment in pig feeding was conducted in which barley was used as the main food, and other foods were tested as regards their suitability for mixing with barley. Feed flour mixed with barley in the proportion of 1 to 3 gave best results, pure barley second best, shorts and barley came third, with chopped oats and barley a poor fourth. Wintering sows outdoors is also being more fully demonstrated as the best method.

POULTRY AND BEES.

The White Wyandotte and Barred Rock breeds are kept. Colony houses are used exclusively on this Farm, and are found quite satisfactory. Experiments were conducted in different types of construction, and figures are presented in the poultry report showing the temperatures recorded. Egg records kept show the pullets to be much better winter layers than the 1-year-old or older hens.

The apiary on this Farm is being used as a source of supply in stocking up the newer Stations. It has been handled more for multiplication than for honey production. Nevertheless, a fairly good crop of honey was garnered, despite a very unfavourable season.

BUILDINGS.

A new solid concrete silo, 16 feet across inside and 34 feet high, was built this year. A stave silo has been in use some years, and it will now be possible to compare the two kinds. A large cement root-house was built under ground in the side of the hill behind the cattle barn. A shed for the threshing separator was also built this year.

EXHIBITIONS.

A large exhibit got up at the Central Experimental Farm was shown at the Brandon and Winnipeg summer fairs. In addition, an exhibit showing some of the work of the Brandon Farm was shown in combination with the general exhibit. An exhibit of horticultural products was made at the annual show of the Brandon Horticultural Society in August 1914.

MEETINGS.

The Superintendent addressed meetings of Manitoba farmers at the following places in the province during the year: Virden, Reston, Souris, Hartney (twice), Melita, Morris, Emerson, Stonewall, Portage la Prairie, Neepawa, Carberry, Carman (twice), Elgin, Hamiota, Oak River, Russell, Birtle, Roblin, Grandview, Gilbert Plains, Dauphin, Valley River, Sifton, Ethelbert, Bowsman, Swan River, Benito, Durban, Kenville,

Minitonas, Ste. Rose du Lac, and Makinak. "Rotation of Crops," "Corn Growing," and "Practical Methods of increasing Production," as well as several other topics, were taken as the subjects of addresses.

The assistant Superintendent judged Seed Fairs and addressed meetings at Minnedosa, Kelwood, and Roblin, speaking at each place on "Hog Raising."

VISITORS.

It is estimated that about 10,000 persons visited the Farm during the year.

METEOROLOGICAL RECORD.

The meteorological record for the year is as follows:—

Months.	Highest Temperature. F.	Lowest Temperature. F.	Mean Temperature. F.	Total Rainfall.	Total Snowfall.	Hours Bright Sunshine.
	°	°	°	Inches.	Inches.	
1914.						
April	69·9	5·8	35·9	2·32	2	141·6
May	80·4	19·8	45·6	2·28	....	196·1
June	88·2	31·5	57·6	2·38	....	179·6
July	101·5	42·5	70·3	1·91	....	267·1
August	102·	29·	62·5	1·02	....	239·
September	87·	26·6	55·1	2·45	....	208·9
October	82·5	13·5	47·	1·54	....	157·8
November	61·6	—27·8	22·1	·03	7	104·3
December	32·5	—31·8	2·7	....	1	82·4
1915						
January	30·5	—42·5	— 1·	....	7	98·5
February	32·	—20·	14·1	....	2	85·8
March	52·1	—15·8	23·1	....	4	193·3
Total	....	....	....	13·93	23	1,954·4

Reckoning 10 inches of snowfall as equivalent to 1 inch of rainfall, the total precipitation for the year ending March 31, 1915, was 16.23 inches.

EXPERIMENTAL FARM, INDIAN HEAD, SASKATCHEWAN.

WEATHER CONDITIONS.

The season of 1914 was far from being favourable for the production of cereal, fodder, or horticultural crops. While there was considerable moisture in the soil from the fall and early spring rains, the dry weather which prevailed during the latter part of May, June, and July resulted in a very short crop of hay, light yield of grain, and vegetables and fruits of an inferior quality. A severe frost on August 9 completely destroyed many of the more tender vegetables and flowers, greatly lowered the feeding quality of ensilage corn, and caused the late-sown wheat to be reduced in quality from one to three grades. The dry weather and frost resulted in the harvest starting one month earlier than the previous season so that the grain was all threshed and much of it marketed early in the season, allowing a large amount of time for fall cultivation. This facilitated the preparing of a larger acreage for crop in 1915.

INVESTIGATIONS IN PROGRESS.

Cereals.—Four named varieties of wheat were under test in 1914. Of these the Marquis is best adapted for the climatic and soil conditions of southern Saskatchewan. While the Prelude was the only wheat which matured before the frost, the yield was so

low that it is not likely to become a commercial wheat in this portion of the province. Out of the large number of varieties of oats grown, the Victory and Banner are among the best. The Manchurian and O. A. C. No. 21 barleys were again among the highest yielders of the six-row type. The two-row sorts did not yield as high, and have a considerably weaker straw. Among these the Canadian Thorpe and Gold gave good results. Premost flax was the highest yielder. Novelty, a new variety produced by Dr. Saunders, gives promise of equalling, if not surpassing, Premost. Arthur and Solo peas gave best satisfaction, maturing much earlier than the other sorts.

Forage Crops.—From the result of tests of different grasses, the Western rye seems to be the best adapted for the production of hay, and Brome for permanent pasture. Among the legumes, alfalfa is best suited to conditions in southern Saskatchewan. At Indian Head the Grimm and Baltic varieties have again given best results. While the fodder corn was badly damaged by frost, it gave a large amount of fodder which was stored in the silo. While this was not equal to the silage produced in former seasons, it supplied a large quantity of succulent feed during the winter. The Northwestern Dent gave best satisfaction. Varieties of turnips, mangels, sugar beets and carrots were tried out at Indian Head this season. For soiling or early fall feeding the fall turnip will give good results and produce a high yield, but for winter feeding only swedes should be used, as they are good keepers and can be fed until the early spring.

Horticulture.—A large number of the varieties of the different kinds of vegetables have been under test for five years, and the inferior sorts will be eliminated this season, giving more time and space for the conducting of cultural experiments with vegetables. The perennial flowers which have proven perfectly hardy are being increased in number, and the seed and roots will be distributed as soon as a supply can be obtained. An endeavour is being made to acclimatize or originate a standard apple that will produce in southern Saskatchewan. A large number of seedlings of the hardy varieties are being propagated, and it is hoped that some of these may produce an edible apple hardy in the West.

Some of the plantations of forest trees which were set out some years ago were cut out during the fall and made into cordwood. Besides the trees in the avenue, plantations, and windbreaks, a large arboretum is maintained. Many of the trees being tried out are proving hardy, and will make magnificent lawn trees. Among the deciduous specimens the Manitoba maple, green ash, and birch are proving most satisfactory. Of the conifers, the Scotch pine seems to be most hardy. Caragana and lilac are both hardy plants, and produce an abundance of bloom in the early spring.

Field Husbandry.—While the season was unfavourable for the production of crops, the results obtained from the field husbandry experiments were very satisfactory, and quite a number of lessons in moisture conservation were learned. A large portion of the Farm is divided into small plots for the purpose of studying different methods of cultivation and crop management and such problems as different methods of summer-fallowing, preparing stubble land for crop, depth of ploughing, methods of packing and different crop rotations are being studied.

Live Stock.—The experimental work with horses includes the cost of producing work horses from both pure-bred and grade mares, and different methods of feeding the idle horses during the winter. The Clydesdale is the breed that is being used.

A start was made to develop a dual-purpose herd of Shorthorn cattle. This season all cows which freshened were put into the test, and the better milkers will be bred to bulls from recognized milking strains.

In the winter, a large amount of experimental feeding is conducted.

This season, two carloads of steers were fed, and such questions as the most profitable age, the best method of sheltering and different rations were investigated.

Shropshire sheep are the breed kept on this Farm. The pure-bred flock is not very large at present and, as it was believed that the sheep could be utilized to good advantage in keeping down the weeds on the summer-fallow, one hundred ewe lambs were purchased last fall and put on feeding experiments during the winter. These will be pastured on the fallow fields and roadways during the summer, and in the fall will be bred to pure-bred rams and their offspring used in feeding experiments. A carload of wether lambs were also fed. These were purchased from a rancher near Lethbridge, and a record kept of the loss in shipping and cost of delivering the lambs at Indian Head. They were then broken up into lots of about twenty-five each, given different degrees of shelter and fed different rations.

Two breeds of hogs are kept at the Indian Head Farm—Yorkshires and Berkshires. No experimental work has been carried on with swine, as a piggery would be necessary for the conducting of it.

The poultry was increased by purchasing a number of bred-to-lay Barred Rocks and White Wyandottes from breeders in Quebec. These were kept in cotton-front houses of different types. In the houses a thermometer was kept which gave a record of the maximum and minimum temperatures.

BUILDING.

During the year very little building was done at this Farm. In the fall an implement shed was put up. This was used during the winter for feeding steers and sheep, but will be utilized in the summer for the farm machinery. A number of the older buildings were repaired and painted, which gave them a somewhat better appearance.

EXTENSION WORK.

During the summer months the Superintendent spent one week on the Provincial Government demonstration train, which at that time was touring the Weyburn-Lethbridge line, and delivered lectures on conservation of moisture and the importance of good seed. In June he also gave two lectures in Regina, before the Convention of Agricultural Secretaries, on soil cultivation and forage crops. In August he visited the Rosthern Experimental Station at the time of their annual excursion, and discussed the varieties under test with the excursionists. In the fall he judged at several seed fairs and gave addresses on the work of the Indian Head Experimental Farm at Windthorst and Grenfell. In December he attended a Farmers' Convention in North Battleford, and gave lectures on moisture conservation and crop rotation.

VISITORS.

During the summer a large number of farmers from outlying districts called at the Farm and discussed their problems with the Superintendent. He also endeavoured to go out when possible and visit the farmers in the vicinity of Indian Head, and discuss with them their problems.

EXHIBITIONS.

In conjunction with the exhibit prepared at Ottawa, one was prepared at Indian Head, which gave an outline of the work being conducted and the results being obtained. A panel setting forth the yields of wheat obtained by different methods of summer-fallowing was the centre of attraction at the fairs where it was on exhibition.

METEOROLOGICAL RECORDS, EXPERIMENTAL FARM, INDIAN HEAD.

Month.	Temperature F.					Rainfall.		Snowfall.	Sunshine
	Maximum.		Minimum.		Mean.				
1914.	Date.	°	Date.	°	°	Days.	Inches.	Inches.	Hours.
April	15	70	6	2	37·53	2	·09	12·	158·5
May	27	83	10	22	50·54	2	·58	10·	243·4
June	2	90	13	40	59·06	6	2·28	....	219·6
July	27	100	16	42	69·80	3	1·50	....	304·6
August	7	89	9	29	59·42	5	1·33	....	231·6
September	18	88	23	28	54·73	3	·47	....	181·9
October	1	80	25	10	44·29	4	1·16	....	126·2
November	2	56	17	—23	24·33	2	1·3	9·	65·7
December	3	27	25	—32	1·93	....	....	4·50	23·3
1915.									
January	18	30	27	—42	3·06	....	....	4·50	37·1
February	17	37	5	— 8	16·82	....	....	5·25	71·6
March	21	51	2	—17	22·55	2	·75	....	195·6
						29	8·29	45·25	1,859·2

EXPERIMENTAL STATION, ROSTHERN, SASK.

CHARACTER OF THE SEASON.

The season of 1914 opened auspiciously; seeding was done in good time and, until the middle of June, growth was more than normal and crops promised a higher than average yield. The expected June and July rains did not come, however, and all crops, especially those put in under any but the most favourable conditions, suffered heavily during July from drought and at harvest time much of the grain was so poorly developed that some fields were not cut. It was a season which sharply defined the careful farmer from the careless one.

Following is the meteorological record for the year April 1, 1914, to March 31, 1915:—

Month.	Temperature F.					Precipitation.			Sunshine.
	Highest	Date.	Lowest.	Date.	Mean.	Rainfall.	Snowfall.	Total.	
1914.	°		°		°	Inches.	Inches.	Inches.	Hours.
April	69·1	16th	5·3	19th	35·8	0·48	1·5	0·63	209·7
May	80·1	16th	22·2	10th	49·8	1·96	....	1·96	264·3
June	84·2	16th	33·3	25th	58·7	2·00	....	2·00	308·3
July	93·8	28th	41·2	23rd	67·5	1·40	....	1·40	339·6
August	87·0	2nd	32·8	10th	60·0	1·12	....	1·12	273·9
September	79·3	19th	30·1	21st	50·9	0·97	....	0·97	203·0
October	81·2	1st	16·7	26th	42·5	1·57	....	1·57	145·7
November	49·9	1st	—20·0	17th	21·7	0·31	8·9	1·20	100·0
December	23·8	1st	—31·8	25th	1·1	....	5·2	0·52	49·5
1915.									
January	30·3	5th	—45·5	27th	0·2	....	6·0	0·60	103·6
February	29·0	18th	—13·3	1st	8·8	....	5·0	0·50	134·7
March	43·0	22nd	—14·8	2nd	17·7	....	....	0·00	190·6
Total from April 1st, 1914, to March 31, 1915	....	....	....	....	....	9·81	26·6	12·47	2,322·9

EXPERIMENTAL WORK.

The experimental work begun in 1911 in cultural methods has been continued but, owing to irregular areas being affected by alkali, the results have been anything but satisfactory. Experiments seeking the relative merits of varieties have been continued in cereals, legumes, roots, corn, and potatoes. Last year there were some hybrid beardless barleys, originated by Dr. Chas. Saunders, tried with very satisfactory results. A number of varieties that had proved unsatisfactory in previous years were discarded last year.

FARMERS' EXCURSIONS AND VISITORS.

With the co-operation of the Canadian Northern Railway, an excursion to the Experimental Station was arranged for July 9 from points west of Prince Albert as far as Blaine Lake and east as far as Tisdale. Special trains were run for the occasion, arriving at 11 a.m. and leaving at 5 p.m.

Assistance was rendered by the Superintendent of the Indian Head Experimental Farm and members of the staff of the University of Saskatchewan. Upwards of three hundred farmers, with their wives and families, availed themselves of the holiday, and altogether the event was so satisfactory to both the railway officials and the management of the Experimental Station as to warrant them in making it an annual affair.

EXHIBITIONS.

The Rosthern and Scott Experimental Stations joined in making an exhibit at the Saskatoon and Prince Albert Exhibitions, representative of the work done at the two Stations. There was a display of fruits, vegetables, flowers, grains, and fodder crops. The exhibit was in charge of an officer from the Central Farm, who also displayed the work of the various Divisions at Ottawa. This exhibit elicited much favourable comment from both the visitors at the exhibitions and the Exhibition Boards.

MEETINGS ATTENDED.

The Superintendent attended a conference of Experimental Farm Superintendents and Dominion Farm officers in Ottawa during January, and attended a series of twenty-five meetings on Patriotism and Production held in various parts of the north of the province during February and March.

ADDITION TO THE STATION.

During the past year the Government extended the area of the Experimental Station by the addition of three quarter-sections and a strip of 15 acres along the Canadian Northern railway. The Station now comprises almost a complete section, besides the strip along the railway, a total area of nearly 650 acres. The new land is mostly level and very uniform, and will lend itself satisfactorily to experimental work. It has been cropped for several years and is in rather poor tilth, and most of it will have to be summer-fallowed the coming season.

NEW BUILDINGS.

In the summer of 1914 a foreman's house was built 22 feet by 26 feet, two stories high, with full cement basement, hot-air furnace, waterworks and sewage disposal. The water pressure is obtained from a tank 2 feet by 2½ by 5 feet in the attic, and the supply is obtained from a well just outside the house, and may be pumped either by hand or by gasoline engine power. The whole plan lends itself admirably to the requirements of an ordinary farm.

LIVE STOCK.

Cattle.—There are two cows kept at the Experimental Station. These are of the dual-purpose Shorthorn type, and supply sufficient milk for the requirements of the families living at the Station. There were purchased last year two Holstein heifers of good breeding.

Horses.—The five work horses and two drivers kept at the Station were in good condition throughout the past year, and were sufficient to do the work. At times it was necessary to call on one of the drivers to help out in the farm work.

Owing to the extension of the farm it was necessary to purchase eight more work horses in March. Two of these are of the Belgian draught type and the remainder of the Clydesdale type.

WATER SUPPLY.

The water used at the Station has been supplied by shallow wells, and has been insufficient for the requirements. A well was drilled to a depth of 106 feet, and a supply of water obtained reaching to within 20 feet of the surface of the ground. After pumping for a day the supply was shut off by sediment. This was cleaned out and the pumps started again with the same result. An attempt will be made to solve the difficulty during the coming season.

EXPERIMENTAL STATION, SCOTT, SASK.

CHARACTER OF SEASON.

Without exception, the season of 1914 was the most unfavourable for crop yields ever experienced in northwestern Saskatchewan. The snowfall during the winter of 1913-14 was very light. Spring opened up about the usual time. Seeding operations commenced on April 11. Typical April weather was experienced, with low temperatures, and more rainfall than in previous years. May was considerably warmer with a few small showers. The usual June rains did not materialize, and July and the first of August were warm and dry. During the last of July and the first part of August, hot winds prevailed, which did considerable damage to crops of all kinds. Considerable rain fell during September and first part of October, which, while too late to benefit the past season's crop, left the ground in good condition for ploughing, and for the succeeding season's crop operations. Total precipitation from April 1 to August 15 was 7·22 inches.

TESTS OF CEREALS.

The comparative test of varieties of cereals is one of the most important of the many lines of experimental work conducted on this Station.

In varieties of wheat tested, Marquis and Red Fife have again demonstrated their superiority. In the test of oats, Banner gave the heaviest yield, while Ligowo holds the record for three-year average. Victory, which had given such splendid yields in the two previous years, was accidentally omitted from the test. O. A. C. No. 21, and Manchurian are two of the most satisfactory varieties of six-row barleys. Duckbill, a two-row variety, has yielded remarkably well. The Arthur peas have proved to be earlier maturing and higher yielding than any other variety tested on the Station.

FIELD HUSBANDRY.

Crop rotation.—The crop rotations on this Station have not been under way for a sufficient period to warrant definite statements being made as to the relative merits of the different systems. Especially is this the case where the treatment calls for

the application of barnyard manure in the rotation. A noticeable feature of this year's returns from the rotations was the fact that the check plot "A," continuous wheat, was the only system which was operated at a loss.

Rates of seeding.—In the amounts of seed per acre, a compilation of the results of the last three seasons' tests points to the conclusion that less amounts of seed than are commonly used of oats and barley will prove more profitable. One bushel per acre of each of these kinds has given higher yields than any other amounts tested.

CULTURAL PLOTS.

The scope of the cultural investigation work has been considerably augumented by the addition of eight experiments.

A few conclusions might be drawn from the four experiments that have been under way for two years.

Use of soil packer.—In the use of soil packers, sufficient evidence has accumulated to indicate that packers are of considerable value in the preparation of the seed-bed, providing, however, that they are not used where the surface soil contains a high percentage of clay, or when the soil is too wet. The most profitable times to use the soil packer appear to be immediately after ploughing and immediately after sowing.

Breaking new sod.—The experiments in methods of breaking the prairie point to the conclusion that ploughing the sod 4 or 5 inches deep, early in June, and cultivating throughout the season, is the most profitable system to adopt.

Depths of seeding.—In the depth of seeding experiment, sowing from 2 to 3 inches deep appears to be the most satisfactory for both wheat and oats.

HORTICULTURE.

Considerable progress has been made in connection with the horticultural work of this Station. A splendid catch of Kentucky Blue grass on the lawn has been the admiration of visitors. The trees and shrubs, planted in groups on the lawn, are thriving. Each year's growth adds considerably to the effect. A number of trees in the arboretum have proved somewhat tender, but a long list of varieties have shown themselves quite hardy.

In the flower border, the paeonies have made a splendid start. Besides the annual flowers, which were sown in the hotbed, and transplanted to the flower border, twenty-seven varieties of annuals were sown outside, most of them blooming splendidly.

Vegetables.—The dry summer seriously affected the yields of vegetables, potatoes only yielding about half an average crop. Corn, cucumbers, and tomatoes were just commencing to bear when the frost came.

LIVE STOCK.

The live stock on the Station at the present time consists of fourteen head of work horses.

Experimental work has been restricted to investigations into the cost of wintering idle work horses, and the cost of raising colts, the average cost of feed for two 3-year-old colts, from time of weaning until three years old, amounting to $56.24.

EXTENSIONS TO THE STATION.

One-half section (320 acres) of land, adjoining the Station, has been purchased for the purpose of extending experimental work in crop production, and providing sufficient feed for further experimental work with live stock.

About 100 acres of new land have been broken up during the past season.

BUILDING AND FENCING.

A comfortable cottage has been built for the farm foreman. The fence around the Station has been neatly painted, and the land purchased has also been fenced. In all, approximately 2½ miles of woven wire fencing have been erected.

EXHIBITIONS.

In conjunction with the Rosthern Station, an exhibit was staged at the Saskatoon Summer Fair.

VISITORS.

Nearly 900 people visited the Station during the past year. An excursion of farmers from the surrounding district visited the Station in July.

MEETINGS ATTENDED.

Since his appointment in August, the acting Superintendent has attended the Superintendents' conference in Ottawa in January, addressed meetings at twenty-two points in southern Saskatchewan, in connection with the Patriotism and Production campaign, and has spoken at a number of local Farmers' Institute meetings. He also assisted in the selection and laying out of a few of the Illustration Stations in the southern part of the province.

Some Weather Observations taken at Scott Experimental Station, 1914-15.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hrs.	
1914.	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
April	37·8	76·5	9·1	1·36	....	1·36	·48	184·5
May	49·0	82·0	18·4	1·05	1·0	1·15	·22	295·4
June	56·9	85·0	34·1	2·37	....	2·37	·46	211·4
July	67·0	96·8	35·2	1·80	....	1·80	·95	309·0
August	59·5	99·5	30·2	1·41	....	1·41	·55	235·1
September	55·2	80·0	28·2	3·46	....	3·46	2·20	192·8
October	41·13	70·1	18·2	3·17	....	3·17	1·75	143·7
November	23·69	51·8	—17·3	....	6·0	·60	·60	100·4
December	2·57	24·8	—23·3	....	18·0	1·80	·60	26·3
1915.								
January	1·49	31·8	—42·0	....	1·0	·10	·10	89·0
February	13·27	30·2	—10·8	....	1·5	·15	·10	111·5
March	41·1	44·8	— 4·8	....	·5	·05	·05	216·7
Total for year	....	....	....	14·62	28·0	17·42	....	2,115·4

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

THE SEASON.

The season of 1914, on account of the very severe drought, will long be remembered as the most trying since settlement has taken place. In some localities, 1910 was just as unfavourable, but the areas affected were more restricted. The rainfall was a little greater near the foothills country on the west and along the Aldersyde branch of the Canadian Pacific railway from Carmangay northwest, but over the balance of southern

Alberta the precipitation was so light that absolutely no grain crops were obtained except on well summer-fallowed fields, and the yields in these cases were, of course, very light. Although it is most unfortunate that the district has had to experience such a lamentable disaster as a practical crop failure, still, one advantage is gained which is that the farmers are brought face to face with the fact that summer-fallowing must be practised on a very much greater scale than has been the case in the past, if similar failures in the future are to be avoided.

In regard to the amount of moisture carried in the soil from 1913 it might be said that the precipitation during the last four months of that year was light, amounting in all to only 2½ inches. During this period, heavy drying winds were prevalent, with little or no snow on the ground, so that the soil moisture was severely drawn upon. To counteract this in a measure, however, 3·63 inches of precipitation was received during the first three months of this year, i.e., January, February, and March, so that the soil was reasonably moist and in excellent condition when work on the land was started.

The first discing, harrowing, or seeding on the Station occurred March 17. The ground froze up toward the latter part of March but opened again shortly, and seeding was begun April 4. Unfortunately, the rainfall during April, May, and until the latter part of June was very much less than usual. For this entire period no soaking rain was experienced. What did come was in the form of light showers that were not sufficient to wet through the dry layer of 2 or 3 inches at the surface and connect with the moisture lower down. The fact that the total precipitation for April and May was only 0·83 of an inch fully illustrates how serious conditions were and how difficult it was to obtain a stand from seeds when sown. A wet spell during the last ten days of June revived things generally, but the dry, hot July was too severe a strain on plant life. Corn, late-sown roots, and potatoes, which were able to profit by the August rains, gave reasonable returns, although they, of course, did much better on summer-fallow. The last frost in the spring occurred on May 12, when a temperature of 29·8° F. was recorded. The first frost in the fall was on September 15, when the temperature dropped to 31·0° F.

CROP YIELDS.

Non-irrigated.—All crops except those sown on summer-fallow and corn land were a practical failure. Field lots of spring wheat sown on summer-fallow averaged a little over 15 bushels per acre, and winter wheat, 14 bushels. The yields of oats and barley were in proportion. Peas and oats sown as a mixture on summer fallow for green feed gave a return of 1 ton and 500 pounds per acre of field-cured hay. The yield of wheat after corn in one of the rotations was greater than wheat on summer-fallowed land. This is rather remarkable considering the extremely dry season, and indicates the possibilities of the dry-land farmer producing a good supply of winter fodder on land that otherwise would be in fallow and returning nothing. Hay, including alfalfa, clover and grasses, failed to make sufficient growth to be worth cutting, except alfalfa in rows, which gave light returns.

Irrigated.—The yields of grain were fully up to the normal. All kinds of hay gave returns slightly in excess of those obtained in 1913.

EXPERIMENTS IN ROTATION OF CROPS.

Non-irrigated.—The necessity of having a summer-fallow introduced every second or third year in the crop rotations was fully emphasized. There are now seven rotations laid out on the dry part of the farm. In addition to these, there is really an eighth one comprising an experiment to test corn planted in hills 3 feet each way, and potatoes similarly planted as a substitute for summer-fallow. The variety of corn used

is the Squaw, which is the only variety which can be relied upon to ripen each year here. In this experiment, which was only started this year, the corn planted on spring ploughed stubble yielded at the rate of 16 bushels and 20 pounds of shelled corn per acre. This is most encouraging when the severe drought conditions are considered.

Irrigated.—On the irrigated part of the Farm there are now three rotations established.

The value of using alfalfa in a rotation is well illustrated by the yields obtained in rotation U, which is a ten-year rotation consisting of six years alfalfa, one year each of hoed crop, wheat, oats, and barley. The average yield of cured hay from the six fields of alfalfa, including the field freshly seeded this year, from which no crop was obtained, was 4 tons and 168 pounds per acre. The total yield of potatoes was 598 bushels (of these, 583 bushels and 25 pounds were marketable); wheat, 63 bushels 30 pounds; oats, 107 bushels; and barley, 46 bushels. The field in which the barley was grown this year has not been in alfalfa on account of the rotation not having been established long enough, otherwise the yield would doubtless have been larger.

SOIL CULTURAL EXPERIMENTS.

The cultural investigation work started in 1911 consists of thirteen lines of experiment. Except on summer-fallow, the yields of grain were practically nil. The drought was so severe that there were no very marked differences between the various treatments given, at least none that deserves special mention.

CEREALS.

The usual variety tests of wheat, oats, barley, and peas were carried out on both the irrigated and non-irrigated land. The yields on the non-irrigated land were all relatively low. There does not appear to be much difference in the yield between Red Fife and Marquis. There is considerable interest taken in the Prelude, but as the seasons in southern Alberta are such that difficulty is rarely experienced in ripening either the Red Fife or Marquis, there would appear to be no advantage in using the Prelude, owing to its much lower yield.

FORAGE CROPS.

Corn raised for fodder did particularly well. The late rains during August brought it on rapidly. In the variety test on non-irrigated land, two of the seven varieties tested yielded at the rate of over 13 tons of fodder per acre (weighed green), and on the irrigated land North-western Dent yielded 26 tons, and two other varieties over 24 tons per acre. The maturity was good, as a few ears on one or two of the varieties ripened.

Turnips, mangels, and carrots did not give particularly good returns owing to the fact that heavy winds prevailed when the plants were coming up, and during thinning time, the result being that drifting soil destroyed many of the young plants, thus injuring the stand.

Hay on the dry land did not grow high enough to be worth cutting, except alfalfa in rows. The yield of alfalfa seed was poor.

On irrigated land the yield of hay, particularly alfalfa, was good, and the dry season made it possible to save it in excellent condition.

HORTICULTURE.

The season was quite favourable for horticultural work. A large number of apples fruited, but the total amount of fruit was not so great as last year owing probably to severe winds at blossoming time preventing the fruit setting as well as it otherwise might. The currants produced much better than usual. The raspberries did fairly well, but the strawberries yielded less than they usually do. This was attributed to a

light frost that came when the plants were in bloom. The berries were smaller than usual, and many were misshapen.

INSTALLATION OF A PUMP FOR IRRIGATION.

One of the main distributing laterals of the Canadian Pacific Railway irrigation system passes through the Station. There is a certain amount of land lying adjacent to this lateral that is too high to be irrigated by it, though nominally " below the ditch." By using a pump and lifting the water 6 to 7 feet it was possible to irrigate this land. In the spring of 1914 a 9-inch suction and 7-inch discharge rotary pump was installed. This was operated by our 20-h.p. gasoline farm engine, and proved to be quite successful. Data as to the cost of operation are being collected.

LIVE STOCK.

No breeding stock is kept on the farm up to the present time.

Winter feeding experiments were carried on with both steers and lambs.

Eighty-four head of 2- and 3-year-old steers were divided into four lots. They were all given the same amount of grain—ground barley—but different kinds of roughage. Lot I, alfalfa; lot II, alfalfa and green oat sheaves; lot III, green oat sheaves; and lot IV, dry corn fodder and alfalfa. A small profit was realized on each lot.

Four hundred and eighty head of range lambs were purchased and put on feed. They were divided into two lots, both lots receiving the same quantity of grain (mixed barley and oats in equal parts, whole) but lot I was fed alfalfa and lot II alfalfa and green oat sheaves. Lot I returned a profit of $1.04 per head, and lot II, $1.37 per head.

POULTRY AND BEES.

Work with poultry was started this year. No fowls were obtained in the spring, but eggs from the Experimental Farms at Ottawa, Agassiz, and Lacombe, as well as some purchased locally, were used for hatching. Owing to unsatisfactory quarters for the incubators and the long distance that most of the eggs had to be shipped, the percentage hatched was not very high. Over 400 chicks in all were reared. One hundred of the best pullets were saved, and 100 hens were purchased. The winter egg production was quite satisfactory. All the pullets are being carefully trap nested. During last spring and summer a very satisfactory start was made in regard to buildings for poultry work. The work for the season of 1915 is starting out quite propitiously, with a fair hatch of rather early chicks.

The man in charge of the poultry is also looking after the bees. At present we have only two colonies. Honey was extracted from one of these, the other was weak owing to the queen dying during the winter previous. The amount obtained was 100 pounds. Work along this line will be extended as soon as it is possible to increase the number of colonies.

BUILDINGS.

A six-roomed cottage for the gardener was erected during the summer. An addition connecting the implement shed to the barn was put up. This will be fitted up for a granary, and part of it will be used for a carriage room. A poultry administration building, a brooder house, and two portable colony houses were erected in connection with the poultry department.

MEETINGS AND CONVENTIONS ATTENDED.

The Superintendent attended the Western Canada Irrigation Association Convention at Penticton, B.C., and the National Irrigation Congress at Calgary, when he acted as one of the judges at the exhibition held in connection therewith. He judged the gardens for the Taber Horticultural Society, and assisted in judging at the Provincial Seed Fair. He addressed meetings on irrigation at Iron Springs, Coalhurst, Purple Springs, and Orton; addressed a meeting of the members of the local U.F.A. at Cowley and the Horticultural Society at Calgary, besides meetings at the following places in connection with the Patriotism and Production campaign: Calgary, Vulcan, Carmangay, Lethbridge, Warner, Raymond, Magrath, Pincher Creek, Stavely, High River, Gleichen, Strathmore, and Medicine Hat. He was a delegate at the organization of the Rural Development League at Olds.

VISITORS.

Each year sees an increase in the number of people who visit the Station. Among these are farmers from all parts of the southern part of the province.

METEOROLOGICAL TABLE.

Month.	Temperature F.			Precipitation.	Sunshine.
	Maximum.	Minimum.	Mean.		
1914.	°	°	°	Inches.	Hours.
April	68·1	16·0	42·4	0·54	195·2
May	79·0	21·2	51·25	0·29	318·9
June	92·0	34·1	58·4	2·48	208·5
July	93·9	40·0	67·5	0·93	386·2
August	97·0	35·4	62·08	3·59	295·0
September	86·0	31·0	52·8	1·07	221·4
October	85·5	20·1	42·88	2·17	137·6
November	66·0	— 8·0	35·7	0·63	89·8
December	42·0	—23·5	9·46	1·19	115·0
1915.					
January	52·0	—26·5	17·06	0·5	112·4
February	47·2	— 4·0	19·98	0·94	126·3
March	67·2	1·8	28·67	0·22	164·5
Total	....	....	....	14·55	2,370·8

EXPERIMENTAL STATION, LACOMBE, ALTA.

The season of 1914 at Lacombe was favourable for the production of general farm crops as well as fruit and vegetables. The precipitation for the months of April to August, inclusive, totaled 9·905 inches, and was ample for the needs of crops. The last spring frost occurred on May 29, but resulted in no serious injury even to fruit blossoms. The earliest frost in the fall came on September 1, and was severe enough to injure corn.

LIVE STOCK.

The horses number twenty-one, cattle ninety-four, hogs thirty-nine, and sheep nineteen.

An outbreak of black-leg occurring in the spring of 1914 resulted in the loss of seven head of cattle. This outbreak was particularly virulent and did not confine itself to young cattle, but caused the death of several breeding cows 5 years old and over. Vaccination of the entire herd was completed as quickly as possible after the disease was diagnosed, and was repeated in six months. No loss has been sustained since the first outbreak.

The feeding trials with beef and dairy cattle were of special interest. Six groups of steers were fed for beef. The primary purpose of the experiments was to test the various forms of shelter, and one group of steers was fed in the brush, one in the corral, and one in the barn. These were fed prairie hay and grain. Three other lots of steers were fed in the barn and checked against those receiving prairie hay. These three groups were fed: (1) green sheaves, (2) silage with straw, and (3) timothy hay. The conclusion reached in reference to shelter is that no buildings are necessary in order to feed steers successfully. The steers in the corral made the most economical gains, those in the brush next, and those in the barn the most expensive gains.

When comparing the results secured from the different fodders, we find that prairie hay fed in the corral stands first in economy of gains; green feed fed in the barn, second; prairie hay fed in the brush, third; prairie hay fed in the barn, fourth; ensilage and straw fed in the barn, fifth; and timothy hay fed in the barn, sixth and last.

All the cattle were sold on March 3, and when killed showed a dressed weight of almost 60 per cent off car.

Different rough fodders were fed to dairy cattle for a period of twenty weeks, in two-week periods. The results indicate strikingly the advantage of silage for the economical production of butter. Since these trials are the first, in the West at least, where an apportunity has been afforded to compare the nutritive value of oat silage with other fodders available here, the figures secured in this test, which include the entire dairy herd, should be of value to dairymen.

It is also of interest to note the daily average production of the three dairy herds at this Station.

Similar conditions surrounded the animals, and similar feeds were fed in each case, and the extremes of production shown are 3,011 pounds and 13,768 pounds. If breeding along definite lines for a few generations will bring such results as are indicated in this table, surely every breeder of dairy cattle should decide to give steady direction to his efforts towards improvement.

SWINE.

The herd of swine has now reached proportions that permit of more experimental feeding being conducted. Five groups of hogs were fed for market during the year, and the figures secured show the net profit to be 2·88 cents per pound, figuring grain at 1 cent per pound. Feeding trials have been conducted to determine the value of frosted wheat *versus* oats and barley and skim-milk, and also the best ration for pigs following weaning.

HORTICULTURE.

For the second year in succession, apples have been produced from various varieties of cross-bred apple trees. This is encouraging as it supports the expectation that if cross-bred apple trees can be carried through several successive winters, certain selections of standard apples may also be grown. To this end about 6,000 apple seedlings are being grown, and from among this number it is hoped a variety will be found which will prove both hardy and satisfactory as to size and quality.

A large amount of tree planting in the grounds has been done during the year. This planting is now having its effect on the general appearance of the Station, and

as it is now practically complete, nothing remains but to await the development of the trees and shrubs. When they have had two or three more years of growth the grounds should present a very creditable appearance.

ROTATIONS.

The rotation work is providing interesting information. The six-year rotation known as rotation "K" is giving very satisfactory results, and is being used in a modified form on the larger fields of the new farm. Here this rotation runs as follows: Hay, manure in winter, twelve tons per acre; pasture; pasture till July and August, plough 6 inches deep and fall work; wheat or oats; oats; barley and seeded down.

This rotation produced a profit last year over all operation costs of $7.60 per acre, or interest at 7 per cent on the land capitalization of over $100 per acre.

SOIL CULTURAL EXPERIMENTS.

Work in this connection is being carried on with the 500 plots as originally planned. Results now known to be of value have been secured in the "depth of ploughing" experiment, "summer-fallow," "stubble treatment," and "seeding to grasses and clover." It may also be possible when additional results have been obtained to secure informative material from other of these experiments.

POULTRY.

This Station has 253 hens, 22 ducks, 9 geese, and 22 turkeys.

Experiments have been conducted during the year as to the comparative merits of the different types of houses: First, for warmth; second, for egg production; third, as to hatchability of chicks from eggs produced therein. The results are not as yet conclusive, but indicate that the least expensive house may prove quite equal in efficiency to the more elaborate types.

BUILDINGS AND IMPROVEMENTS.

A new office building was erected which provided much-needed accommodation for the rapidly increasing office work in connection with this Station.

Over 2 miles of wire fence was erected, and alterations were made in a number of the buildings. The cattle barns were painted inside, the horse barn was sheeted inside, and the windows in the straw poultry house altered and adjusted to permit of better ventilation. A new corral was built to accommodate a larger number of feeding steers, and a number of colony houses were erected in which to winter the brood sows and to carry on feeding experiments.

FAIRS.

This Station assisted in putting on an exhibit illustrative of the work of the Experimental Farms system at the following exhibitions: Cargary, Lethbridge, Medicine Hat, Red Deer and Lacombe.

MEETINGS ATTENDED.

The Superintendent addressed a Farmer's Convention held by the Board of Trade, North Battleford. He spoke on the subjects "Grading up a Dairy Herd" and "Food Stuff available for Alberta Dairymen," at two sessions of the short course in agriculture held by the Board of Trade, Calgary. He was one of the speakers at seventeen meetings held in central Alberta in connection with the "Patriotism and Production" campaign. He spoke before the Provincial Dairymen's Association at Olds on

"Grading up a Dairy Herd." He attended a Conference of Superintendents with the officers of the Experimental Farms system in Ottawa in January. He acted as judge of cattle, sheep, and swine at the Provincial Winter Fair, Calgary, of sheep and swine at the Calgary Industrial Exhibition and of dairy cattle and swine at the Brandon Exhibition.

METEOROLOGICAL OBSERVATIONS at Lacombe, Alberta, 1914-15.

Month.	Maximum.	Minimum.	Date Maximum.	Date Minimum.	True Mean.	Precipitation.	Sunshine.
1914.	°	°			°	Inches.	Hours.
April	72·6	14·7	30th	2nd	40·1	·34	174·2
May	77·3	24·3	24th	6th	47·89	1·285	291·9
June	84·8	36·1	2nd	24th	55·81	6·07	218·7
July	87·6	39·3	3rd	29th	62·25	1·11	316·8
August	85·8	32·2	1st	31st	58·1	1·10	265·3
September	80·3	23·4	29th	16th	51·12	2·36	172·9
October	77·0	19·9	15th	22nd	47·1	·30	120·6
November	58·8	—18·1	3rd	16th	40·39	1·5	84·8
December	48·8	—19·1	17th	11th	11·3	·98	66·1
1915.							
January	40·8	—25·1	18th	26th	13·5	·295	70·0
February	42·8	— 6·6	15th	2nd	17·4	·025	109·8
March	64·8	— 1·1	22nd	4th	27·835	·075	163·9
Total	....	....	....	....	....	15·440	2055·0

EXPERIMENTAL STATION, INVERMERE, B.C.

THE SEASON.

The season of 1914-15 was on the whole an unfavourable one. The spring was backward, work did not commence on the land till April, and seeding not until the last week of the month. The continued cold weather and chilling winds prevented either field or garden crops making satisfactory progress. There was a fair amount of rain during the early summer, but August was a dry month, and much late irrigation was necessary. The irrigated plots gave satisfactory results, but the non-irrigated were only poor. Early frost in August destroyed many tender varieties in the garden. Harvesting operations were carried out in fine weather, and fall ploughing was possible up to November 7, when the last furrow was turned. The winter season has been a favourable one throughout, the land is in good condition, and the coming season promises well.

WORK CARRIED ON DURING YEAR.

The regular work in field and garden was carried on at the Station. In the department of field husbandry many of the experiments were set out with the idea of discovering to what extent irrigation is necessary, and how it is to be employed to be productive of the best results. These experiments were begun this last season, but being yet in their inception no definite data can be supplied.

A number of rotations will be given their second year's test in the coming season. These are chosen to meet the peculiar problems of the district, and are for both irrigated and dry farming. The land being deficient in humus, only fair yields were

obtained last season of either cereals or roots. It is hoped, however, to demonstrate as time goes on, how judicious treatment of the soil will materially affect its productivity.

Among the horticultural experiments, the most important, in point of view of local needs, are those dealing with potatoes, the attempt being to determine one or two kinds which can be confidently recommended to settlers in the district. Thirty-seven varieties were tested both in 1913 and 1914, and the results were singularly uniform. Another year's tests will produce more definite data, but meanwhile, taking into consideration both quality and quantity of yield, the Wee McGregor, Sir Walter Raleigh, and Late Puritan seem to be among the best. Six early varieties were also tested. Planted on April 13, they all gave good yields when harvested July 16.

The bush fruits have made satisfactory growth, and the trees in the apple orchard, which made a good start, continue to do well. It is too early yet to make any statement as to the suitability of this district for apple culture, the experiments not being yet sufficiently advanced.

Avenues of Norway maples have been planted along the road bordering the south fence of the Station, and also along the north drive, and are doing well.

LIVE STOCK.

There are at present, on the Station, one heavy team for the regular work of the farm, one general-purpose horse, two milch cows, which give a sufficient supply of milk for all employed on the Station, and two steers which have been recently purchased to conduct feeding experiments with roots produced last season.

POULTRY AND BEES.

There are now four pens of poultry, one each of Barred Rock and Light Sussex, and two pens of White Leghorn. The birds have come through the winter well, and have given fair returns in eggs.

The incubators are now running, and the birds have been removed from their winter location, near the stables, to the large runs on the land to the west of the farm proper, on the slope of Tobey Creek. The three colonies of bees survived the winter. One was placed in the cellar and the others remained outside. They have now been removed to the new poultry runs.

BUILDINGS AND IMPROVEMENTS.

A convenient implement and tool house, 24 feet by 36 feet, has been erected on the Station, and a roothouse and storeroom, which also provides accommodation for the incubators and for testing eggs, has been built on the poultry grounds. An addition of two new poultry-houses has also been made.

The roads on the Station have been changed, in order to use the land to better advantage, and the main driveway now enters the Station grounds from the south, and a road runs east and west from the stables, across the northern part of the farm.

On September 7, the Dominion Cerealist visited the Station, and chose a tract of land in the southwestern part of the Station inclosure where a number of cereal tests will be commenced this season.

During the season the Superintendent has visited a large number of the farmers of the district who were anxious to obtain advice on some problem connected with the management of their farms. He also visited the Cranbrook Farmers' Institute meeting in January, and took part in the discussion there of "Marketing Problems" and "The Rotation of Crops." Now that the railway service has been extended through Invermere he expects to be able to do more along these lines.

Addition has been made to the stock of implements at the Station, by the purchase of a pulverizer, a hay carrier, and a reaping attachment for a mower.

METEOROLOGICAL REPORT.

Month.	Highest Temperature.		Lowest Temperature.		Total Precipitation.	Bright Sunshine.
1914.	Date.	°	Date.	°	Inches.	Hours.
April	30th	71	1st	22	1·25	165·1
May	16th	87	6th	28	1·46	237·1
June	18th	85	6th	34	1·59	98·4
July	31st	95	16th	42	1·57	314·5
August	1st	95	31st	33	·75	267·9
September	2nd	80	30th	33	2·16	148·3
October	16th	66	22nd	24	·77	86·7
November	25th	51	15th	3	·79	56·4
December	2nd	35	15th	—16	·42	86·8
1915.						
January	11th	36	21st	—15	·51	46·0
February	17th	44	14th	— 1	·30	70·9
March	21st	63	26th	12	·03	175·8
Totals					11·60	1853·9

EXPERIMENTAL FARM, AGASSIZ, B.C.

THE SEASON.

The season of 1914 was a good one for crop production. The total rainfall was considerably below that of the previous year, but was more favourably distributed. Seeding operations were begun in good time in April. July and August were very dry, only ·75 inches of rain falling in the two months. Heavy rain fell in October and through November, which made the harvesting of roots and corn somewhat more difficult. The winter was very mild; no snow has fallen during the entire year.

METEOROLOGICAL TABLE.

Months.	Maximum Temperature.		Minimum Temperature.		Mean Temp.	Total Precipitation.			
						Rain.		Sunshine.	
1914.	Date.	°	Date.	°	°	Inches.	Days.	Hours.	Mins.
April	21	72	1	31	51·55	2·94	28	143	54
May	22, 15	85	4	36	56·28	3·55	24	202	
June	15	87	4	39	52·91	5·18	26	176	18
July	17	87	6	40	62·075	·15	27	246	54
August	19	87	3	44	62·995	·60	28	224	30
September	23	78	25, 27, 30	40	52·33	6·29	18	60	30
October	15	71	4	34	50·4	7·53	24	111	30
November	1, 28	52	16	28	42·6	14·72	13	36	18
December	2, 8	49	21	16	35·235	·53	21	80	18
1915.									
January	20	53	26	16	37·065	7·17	17	69	30
February	20	55	14, 19, 26	28	41·02	5·67	23	69	30
March	21	73	9, 19	30	48·11	2·45	26	131	24
Totals						56·78	275	1552	36

The following crops were grown for stock-feeding:—

	Tons.	Lbs.
Corn silage	211	710
Clover silage	124	
Mangels	84	1,450
Turnips	6	155
Carrots	3	1,520
Sugar beets	....	1,820
Potatoes	9	1,200
Mixed grains	15	753
Barley	1	356
Oats	1	782
Peas	....	1,200
Clover hay	82	800

A large block of land has been carefully prepared for permanent cultural and fertilizer experiments, and has been divided into 205 plots. Part of these will be devoted to a four-year rotation, the rest to experiments with the various fertilizers, natural and artificial. This land has been under preparation since 1911, and is now in fit condition for experimental work.

A considerable amount of labour has been devoted to fencing and draining. Nineteen hundred feet of new fence has been erected. The main ditch at the back of the Farm has been cleaned out and put into good condition.

Some 14 acres of land have been cleared and prepared for crop. The figures on the cost of these operations and the methods employed are useful, and will be found in the special report on Field Husbandry.

During the whole year the force of working horses has been kept busy, either at the ordinary field work or at fencing, land clearing, etc. Work horses alone are kept on this Farm, so there is no experimental work to report. Figures have been collected, however, on the cost of keep of heavy and light draught horses. Two of the old horses, which were worn out, were destroyed, and three heavy draught colts were purchased at the close of the year.

With the Holstein-Friesian herd, the breeding work has been continued with the same objects as hitherto. Some of the older grade cows have been culled out, as falling below the improved standard of the herd. As a result of the high prices of food, the profit per cow was low as compared with last year, though the yield was a little larger. Of the calves born, 68 per cent were heifers, as compared to 50 per cent last year. The cows have kept healthy, and there have been no losses from death.

Some feeding experiments were conducted with the object of testing the relative values of certain foods for cows and calves; also with clover silage for dairy cattle. The results of these will be found in the special report on dairy cattle for this Farm.

In the breeding herd of Yorkshire hogs there are now thirty-three head: two stock boars, twenty-five mature sows, and six young sows. The performance of the sows was quite up to standard; and the litters produced were strong and healthy.

Figures were collected on the cost of up-keep of boars (aged and young) for one year, and also the cost of raising young brood sows to one year of age. Since the price of foods is relatively high, these figures should constitute a safe estimate.

Last year some experimental work on rice meal, as a food for swine, was reported. The work has been continued on a large scale this year, with good success. It would appear from the results of a large number of trials, that the injurious effects of rice meal can be counteracted by the addition of phosphorus to the ration.

The flock of Dorset Horned sheep has shown considerable improvement in performance during the past year, following the severe culling and the addition of new blood in the shape of an imported ram. Lambing is at present in progress and so far the ewes have given 200 per cent lambs, all of which are strong and healthy.

The poultry work has been increased, and some useful results have been obtained in the experimental work. As heretofore, only two breeds of fowls have been kept, viz.:

Barred Plymouth Rocks and White Leghorns. In addition to these, however, a start has been made with ducks and some homer pigeons have been secured, with the object of raising squabs.

The farm dairy has been enlarged and repaired, and the facilities for cheese making improved. The work is in charge of Miss R. Keene. The number of outside samples sent in for testing has greatly increased during the year.

In the variety tests of cereals the following general results were obtained: Wheat, owing to the previous destruction of the crop by the "wheat midge" was discontinued. It appears, however, that the insect migrated to the barley in sufficient numbers to perpetuate the species.

Of the fifteen varieties of oats tested, Gold Rain gave the highest yield this year. Eighty Day was the earliest maturing, but the lighest yielder. Six varieties of two-row barley and eight varieties of six-row barley were tested. The yields were higher than last year. Of the two-row barley, Danish Chevalier came first, and Beaver second. Of the six-row, Trooper and Odessa headed the list.

Nine varieties of peas were grown, and though short in straw, produced an average crop of grain. The highest yielding variety was Solo, with 53 bushels per acre. Golden Vine and Prussian Blue were second and third, respectively.

The horticultural work, in charge of Mr. J. D. Brydon, consisted of an extensive series of variety tests with vegetables, the care of the young orchard of 4 acres, the variety testing of flowers and bulbs, and the care of the lawns and garden. Some useful notes were made on the ornamental trees and shrubs, of which there are a great number on this Farm.

The work in apiculture has been facilitated by the erection of a small bee-house and yard. This year, seven hives produced 375 pounds of honey, an average of 53·5 pounds per hive.

In the course of the year, 485 samples of potatoes were distributed. Of these, 265 or 54 per cent were reported on. Of the results obtained, 78 per cent were reported clean.

EXPERIMENTAL STATION, SIDNEY, B.C.

The spring season commenced early in April with fine weather and light showers of rain which gave promise of a good growing season, but on account of cool nights in April, May, and June, with fogs in the morning and only 0·27 inch rainfall during the months of July and August, results were on the whole only fairly satisfactory and some cereals sown the first week in June had to be cut in September for green feed.

The general harvesting was finished on August 12; threshing and baling straw was done in September. The samples of grains harvested and threshed were well up to standard, the yield being a fair average, considering the very dry season.

During the month of October, field roots and potatoes were lifted and pitted for storage (not for frost protection).

Seventeen varieties of potatoes were planted in October for a winter experiment, and on March 31, 1915, they all showed good growth.

Arlington Awnless barley and Thousandfold rye, sown in the month of November, were in full ear on March 31, 1915; red and crimson clover, sainfoin, alfalfa and swiss chard sown at the same time are a good catch. These all being now two years old here, demonstrate with other experiments in horticulture that acclimatized seeds are fully fourteen days in advance of new imports.

The temperature during the month of March, 1915, was very even, showing a variation from maximum to minimum of only 29 degrees. These conditions called for early spraying. Early plums, peaches, a few cherries and pear trees commenced to bloom March 15.

During the months of July and September, many visitors and societies visited the Station, their interest having been stirred by seeing and hearing of the good collection sent by the Experimental Station for Vancouver Island to the Vancouver Exhibition to supplement the exhibit from the Central Experimental Farm at Ottawa.

METEOROLOGICAL RECORDS.

Month.	Temperature.			Rainfall.	Sunshine.	
	Highest.	Lowest.	Mean.			
1914.	°	°	°	Inches.	Hours.	Mins.
April	68	34	50·38	1·63	172	
May	82	40	56·	·28	293	
June	83	38·5	58·50	2·14	281	4
July	85·5	44	64·23	·13	342	
August	83·5	46	62·36	·14	300	2
September	72	41·5	54·07	1·97	87	4
October	66	39	51·90	3·63	94	4
November	56	32	46·30	8·20	46	30
December	41·6	34	37·80	1·21	72	56
1915.						
January	49	27·5	38·50	2·77	70	4
February	51	31	41·60	1·66	65	9
March	64	35	47·	1·65	142	42
	....	....	....	25·41	....	

Dominion of Canada

DEPARTMENT OF AGRICULTURE

Dominion Experimental Farms

REPORT

FROM

THE DIVISION OF CHEMISTRY

For the Year ending March 31, 1915

Prepared by

Dominion Chemist. - - - - - - - - - Frank T. Shutt, M.A., D.Sc., F.I.C., F.R.S.C.

REPORT OF THE DIVISION OF CHEMISTRY

FRANK T. SHUTT, M.A., D.Sc., F.I.C., F.R.S.C.

DOMINION CHEMIST.

OTTAWA, March 31, 1915.

J. H. GRISDALE, Esq., B.Agr.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit, herewith, the twenty-eighth Annual Report of the Division of Chemistry of the Dominion Experimental Farms.

Circumstances of a peculiar and very trying nature, arising largely from the outbreak of the European war, have, during the past year—and more especially during the last six months—very seriously interfered with the progress of the work of the Division. Enlistments for Active Service and resignations among the members of the chemical staff followed in quick succession in the early autumn months of 1914, so that long before the close of the year but one of the five assistant chemists remained at his post. Every effort was made to fill the vacancies as quickly as possible, but considerable difficulty was experienced in finding suitable men, and despite our best endeavours many weeks—several months, indeed—elapsed before the staff was brought up to its previous force. Indeed, several of those appointed to take the places of those who had left for the front resigned within a few weeks of their engagement, in order to enlist for service, and, at the time of writing, the staff is considerably below its normal strength.

Further, our usual work has been interrupted by the undertaking of certain special investigations brought into prominence or made necessary by present war conditions, as, for instance, the preparation of potassic fertilizers from seaweed and other native sources of potash.

The "Patriotism and Production" campaign, conducted throughout the Dominion in the early months of 1915 also made its demands upon our time, in the writing of special bulletins and articles and in replying to the numerous inquiries sent in as a result of this effort toward better and more profitable farming in Canada. In this connection, it is very satisfactory to note that this campaign appears to have been very successful in awakening throughout the country a lively interest in many matters pertaining to a larger and more economical production of crops and farm produce in general.

These matters are mentioned here chiefly for the reason that at the present time there is a large accumulation, both of letters and samples, awaiting our attention. For months past it has been quite impossible to keep pace with the many demands made upon us, and we must therefore ask the exercise of patience on the part of our correspondents, assuring them that every possible effort will be made to meet their wishes. As far as may be practicable, the samples sent in for examination and report are taken in hand in the order in which they are received. As every sample is duly registered, on its arrival, in the books of the Division, neglect through oversight is not likely to occur.

SAMPLES received for Examination and Report for twelve months ending March 31, 1915.

Sample.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	P. E. Island.	Total.
Soils	82	1,009	389	462	91	68	23	23	11	2,15
Muds, mucks, and marls	1	......	......	......	5	9	4	3	12	34
Manures and fertilizers	23	2	......	......	19	19	10	10	4	87
Forage plants and fodders, feeding stuffs	20	21	17	6	129	43	3	11	7	257
Waters	29	29	36	6	186	31	13	5	1	336
Insecticides and fungicides	......	......	1	......	25	......	......	......	......	26
Miscellaneous	40	7	9	5	779	81	4	4	2	931
										3,829

The total number, 3,829, exceeds by more than 1,000 the number of samples of the previous year—an indication of the increase of the work in this branch of the Division's activities and of the growing appreciation on the part of our farmers of the assistance that may be obtained from chemical research.

Conservation of Soil Moisture.—We have continued the investigation begun in 1912 on certain of the branch Farms and Stations in the Canadian Northwest, to learn the influence of various cultural methods and systems of cropping upon the moisture content of the soil. On the plots under experiment, soil samples are taken at certain intervals throughout the growing season and forwarded to the laboratories at Ottawa for their moisture determination. From 200 to 300 are analyzed in this respect monthly. The samples are collected at such depths that the results may indicate the available moisture throughout the soil to a depth of 6 feet.

This investigation is still in progress, but it has already afforded evidence of the importance of early and fairly deep ploughing of summer-fallows, of the subsurface packing of light soils and of frequent cultivation of fallows in checking surface evaporation.

Soils from the C. P. R. Irrigation Tract in Alberta.—This work has been undertaken for the Irrigation Branch of the Department of the Interior, and has for its object the giving of assistance to the engineers who are engaged in the reclassification of the lands of this section. It has added much to our knowledge of the soils of Alberta and their suitability for farming under irrigation. It has also assisted in defining such areas as may be too heavily impregnated with alkali for agricultural operations. About fifty groups of soil, each consisting of three to seven members, have been examined and reported on as to fertility and alkali content during the year.

Fertilizer from Seaweed.—For many years the Stassfurt (Germany) mines have furnished all the potash compounds used for fertilizing purposes. The supply from this source was entirely cut off at the outbreak of the European war, and the question of finding some home source of potash to supply the deficiency immediately became one of vital interest to Canadian agriculture. Among the inquiries that we have made to that end is the utilization of the seaweeds that occur in abundance upon the Atlantic and Pacific seaboards.

The manurial value of seaweeds, especially in the potash and nitrogen they contain, has frequently been pointed out in the reports of this Division. Indeed at the time the

war broke out, the analysis of an extensive series of seaweeds collected on the Pacific coast through the kindness of the Dominion Biological Board, was in progress. Seaweeds differ greatly in composition and especially in potash content, according to variety, time of year at which they are collected, etc. Our investigation has shown that many varieties found on our seaboards are of very considerable value for fertilizing purposes.

Through the courtesy of the Department of Naval Service, the Dogfish Reduction Works at Clarke's Harbour, N.S., has been placed at our disposal for several months, to enable us to make a practical trial in the preparation of dried ground seaweed for use as a fertilizer. A preliminary survey of the district has been made as to the possibility of a supply of the fresh seaweed, and steps taken to obtain suitable machinery for cutting and grinding the material. At the time of writing the matter has so far progressed as to enable the writer to say that the prospects are very fairly good for the success of the undertaking, and that a material in a convenient form for application may be economically prepared which will furnish appreciable amounts of potash and nitrogen in forms that may become more or less readily available for crop use.

The Influence of Environment on the Composition of Wheat.—This investigation, begun in 1905, has been continued. It has shown that climatic or seasonal conditions may profoundly modify the protein content of the grain. Wheat from the same stock is sown on the Farms and Stations of the Experimental Farm system throughout the Dominion, and the harvested product analyzed. The results are studied in the light of the information supplied by the several Superintendents as to character of the season, soil, etc., taken from notes made in the field. It would appear that the conditions conducive to a hard berry with a high gluten content are a moderately dry soil and fairly high temperatures during that period in which the kernel is filling out.

Unfortunately, due to pressure of other work, the analytical data from the 1914 crop have not at the time of writing been obtained. We expect to record and discuss them with the results of 1915.

The value of our results in the work will in the future be greatly enhanced through the co-operation of the Meteorological Service, which has kindly undertaken the tabulation of the weather statistics at the various points at which we are conducting this investigation and the correlation of these data with the figures for the growth and yields of the wheat on the several plots.

Experiments with Fertilizers.—Our work with fertilizers at Fredericton, N.B., and Kentville, N.S., has been continued, and it is of interest to note that the results of 1914 confirm, in the main, those previously obtained. For potatoes, on soil in fair condition, the most profitable results have been from moderate rather than heavy dressings of a "complete" fertilizer. Fertilizer materials containing but one or two of the elements of fertility as a rule have not given as profitable returns as those furnishing all three elements. Further, the largest yields have not always given the largest profits, which, for the purposes of the investigation, may be considered as the value of the increased yield over that of the unfertilized area less the cost of the fertilizer.

It is with pleasure that we can report that the details for further investigational work with fertilizers on systematic and scientific lines have been perfected. It is confidently expected that this new experimental work will be started this spring (1915) at the Experimental Stations at Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., and Agassiz, B.C. Preparations are also being made, by cropping and testing suitable areas, at the Stations at Cap Rouge, Que., Lennoxville, Que., and Sidney, B.C., for the inauguration of similar experiments in 1916.

Considerable interest has been awakened in Eastern Canada and in British Columbia during the past year in the matter of lime and ground limestone for the

improvement of soils. We have in consequence issued a special bulletin on the subject under the title of "Lime in Agriculture" (No. 80, Experimental Farm Series). This bulletin, copies of which are still available, deals in a popular and succinct manner with all the more important phases of the subject. A number of samples of lime and limestone have been sent in for examination and report, and these, as far as time permitted, have been submitted to analysis. The data of these are now recorded; they will prove of value for the purposes of reference.

An experiment in liming has been carried out with the assistance of the Superintendent of the Experimental Station, Cap Rouge, Que. The results on the whole have been most gratifying, and the attention of our readers who are interested in this important subject is directed to the chapter. It furnishes an excellent illustration of the value of the application of lime to a soil deficient in this element.

Fodders and Feeding Stuffs.—The larger number of the "feeds" analyzed are from stock used in feeding experiments with dairy cows, sheep, and swine, conducted by the Division of Animal Husbandry at the Central Farm, Ottawa. The results will prove of value to those studying these experiments, and also to others who may be purchasing these feeds. In these days of high prices of nearly all classes of mill feeds and milling products, it is important for true economy that the farmer should be able to compare the feeds offered, not only as to price per ton but also as to composition, more particularly as to protein and fat content.

The chapter also includes the analyses of certain forage crops used in feeding experiments at the branch farms, together with data of certain feeds of a more or less miscellaneous character submitted to us for a report as to their nutritive character. These should prove of considerable interest to dairymen, stock raisers, and indeed to all farmers, for the economic feeding of stock merits closer attention than it has generally received in the past.

Sugar Beets.—Evidence of a very satisfactory character has been obtained as to the suitability of soil and climatic conditions in many widely distant points in the Dominion for the production of sugar beets for factory purposes. This is a continuation of an investigation that has been carried on for a number of years. The varieties tested on the branch Farms and Stations were, as heretofore, Vilmorin's Improved A and B, Klein Wanzleben, and Très Riche, the seed being obtained from Messrs. Vilmorin, Andrieux et Cie., Paris, France. The results of our work are increasingly valuable as the years go by in indicating the possibilities of Canada as a sugar producing country.

Field Roots.—As for a number of years past, analysis has been made of the principal varieties of mangels, turnips, and carrots grown on the Central Farm, Ottawa. The results serve as an indication of their comparative nutritive values.

The question of heredity as related to composition in mangels has also received attention. This study, now in its fifteenth year, has shown that the Gate Post is invariably richer in dry matter and sugar than the Giant Yellow Globe, the two varieties that have been annually examined in this investigation.

Well Waters.—We have continued the work in connection with the examination of the water supplies of farm homesteads. Much interest in this matter is being evinced by our farmers, and it is gratifying to note from year to year the increasing number of applicants for advice and an examination of their well water. Undoubtedly this is a vital subject, the importance of which it is difficult to overestimate. As we have frequently remarked, there is no more valuable asset on the farm than an ample supply of pure water, and we have reason to believe that the number of farmers accepting this statement and acting upon it, is steadily increasing. Nevertheless there is yet much to be done in this useful propaganda, for on too many farms to-day the water is obtained from shallow wells, dangerously located as regards pollution.

The number of samples submitted to complete analysis during the year was 195, of which forty-nine were pronounced pure and wholesome, fifty-four as highly suspicious and probably dangerous, thirty-six as very seriously polluted, and fifty-six as non-potable by reason of high salinity.

Meat Inspection Division.—This work consists in the examination of samples collected by the inspectors of the Meat Inspection Division, Health of Animals' Branch, Department of Agriculture, at the various packing houses and fruit and vegetable canneries throughout the Dominion. These samples comprise dye stuffs, preservatives, pickling solutions, spices and condiments, preserved meats, evaporated apples, etc. The reports from this work are submitted to the Veterinary Director-General.

In the following table we give a classification of the samples examined during the year ending March 31, 1915.

SAMPLES received from Meat Inspection Division for Examination for Year 1914-15.

Nature of Sample.	Number Received.
Lards, tallows, oils and butters	13
Preserved meats, sausages, mince meat, etc	123
Colouring and dye stuffs	147
Preservatives	145
Pickling solutions	50
Spices and condiments	129
Evaporated apples and waste	26
Miscellaneous, etc	29
	662

This work, which yearly increases in volume, necessitates a very considerable amount of skilful, careful analysis. In many instances it has been found necessary to devise special analytical methods, and this naturally means much time consumed in research.

Fertilizing Value of Rain and Snow.—The data for the eighth year of this investigation are recorded. During the year ending February 28, 1915, there were furnished from these sources for the enrichment of the soil, 4·905 pounds of available nitrogen per acre. The average amount for the past eight years, per annum, is 6·023 pounds per acre.

The Staff.—The resignation of Mr. A. T. Charron, M.A., first assistant chemist since July 1, 1898, was tendered, and accepted with much regret, on August 31, 1914. For more than sixteen years Mr. Charron performed much faithful and good work in assisting with the correspondence and lecturing in French on agricultural subjects, and in the general analytical work of the laboratories. Mr. Charron's practical acquaintance with farming operations, coupled with his analytical skill and technical knowledge in the chemistry of soils, manures, feeding stuffs, and other agricultural matters, made his services peculiarly valuable to the Division. In all his duties Mr. Charron proved an efficient and obliging assistant, and I was very sorry to lose so earnest and valuable a co-worker.

Mr. C. H. Robinson, B.A., has continued in charge of the examination of the meat inspection samples, and has also done excellent work in a number of the investigations carried out by the Division. As the sole remaining member of the staff of assistants present with us at the outbreak of the war, a large share of the general analytical work of the laboratory has fallen upon Mr. Robinson during the past year.

Mr. A. T. Stuart, B.A., was granted a year's leave of absence from March 1, 1915. In addition to water analysis, nitrogen determination, etc., Mr. Stuart assisted in the

planning and carrying out of the experiments with fertilizers on the branch Farms and Stations, and in this work has shown a special aptitude. His position on the staff has been temporarily filled by the appointment of Mr. C. W. Graham, B.A., who is doing good work.

Mr. J. T. Janson, B.Sc., who was appointed in July, 1913, was granted leave to enlist for active military service in August, 1914, when he immediately left to rejoin his regiment in England.

Mr. J. M. Scott, M.Sc., appointed in March, 1914, resigned his position in August of that year to accept a post on the staff of the Normal School, Truro, N.S.

Mr. G. N. Kennedy, B.A., appointed January 1, 1915, resigned February 15, 1915, to enlist for active military service.

Mr. L. Aitchison Browne, B.Sc. (Edin.), was appointed assistant chemist on the staff, January 15, 1915, and has already proved himself a careful and accurate analyst and a faithful worker.

The assistants engaged for the Department of the Interior in the analyses of the soils from the C.P.R. Irrigation Tract, Alberta, during the year have included Messrs. W. S. Funnell, H. S. Heustis, C. R. Rubidge, and L. L. Bolton. At the time of writing Mr. Rubidge is alone in the conduct of the work.

I have the honour to be, sir,

Your obedient servant,

FRANK T. SHUTT,
Dominion Chemist.

FERTILIZER EXPERIMENTS.

The experimental work with fertilizers inaugurated in 1913 at Fredericton, N.B., and Kentville, N.S., the results of which were discussed in last year's report, has been continued, and we can now record the data obtained from the second season's operations. The writer is indebted to Mr. W. W. Hubbard, Superintendent of the Experimental Station at Fredericton, N.B., and to Mr. W. Saxby Blair, Superintendent at Kentville, N.S., under whose control the field work has been carried on, for the tabulated data included in this report. The writer further wishes to place on record his thanks for the valuable assistance and hearty co-operation which these gentlemen have given him in the prosecution of this important investigation.

Experiment I.

To ascertain the relative efficiency of several forms of nitrogen (including fish scrap) and of phosphoric acid in formula 4:8:10. Potatoes and Oats.

This experiment was planned more especially to ascertain the merits of dogfish scrap as a source of nitrogen, but the scheme also included trials with other forms of nitrogen, as in nitrate of soda and sulphate of ammonia, and further permitted of a comparison of the value of phosphoric acid as furnished by superphosphate and basic slag. To ascertain the residual effects of the various fertilizers, a three years' rotation of potatoes, grain, and clover will be followed.

The work was carried on both at Fredericton, N.B., and Kentville, N.S.

At Fredericton the experiment was conducted in duplicate. The area comprised eighteen plots, each of one-tenth acre, two of which were used as checks. The land was somewhat heavy and had been in sod; it was spring ploughed and thoroughly prepared. The test was made with potatoes, the varieties Delaware, Green Mountain, and Irish Cobbler being planted in equal quantities on each plot.

At Kentville, the land on which this experiment was carried on had been cleared of green stumps in 1912. It was seeded to buckwheat in 1913, which had been ploughed under. In 1914 the soil was ploughed and thoroughly worked and planted with apple trees, set 20 by 40 feet apart. The space between the trees was utilized for this experiment, the plots being 96·8 feet long and 30 feet wide or one-fifteenth of an acre each. The fertilizer was broadcasted on the prepared soil, before planting, and harrowed in. The whole area was sown to Ligowo oats, to within 3 feet of the trees, the strips on either side of the trees being cultivated throughout the season. The oats were sown by drill on June 2, and the crop harvested September 10. The growth on the plots was fairly uniform except upon the check plots, on which the straw was shorter.

At both Stations the several ingredients were mixed for each plot in such proportions as to make a fertilizer represented by the formula 4:8:10. These mixtures were applied in such amounts as would be equivalent to dressings at the rate of 500, 750, and 1,000 pounds per acre, as indicated in the table of data.

Table I is largely self explanatory, recording the several amounts of the various fertilizer ingredients applied to the plots and the yields of potatoes at Fredericton and of oats at Kentville obtained, as calculated per acre.

TABLE I.—RELATIVE EFFICIENCY of several forms of Nitrogen (including fish scrap) and Phosphoric Acid, in Formula 4:8:10. Potatoes and Oats.

Plot.	Nitrate of Soda.	Sulphate of Ammonia.	Fish Scrap.	Superphosphate.	Basic Slag.	Muriate of Potash.	Fertilizer, 4:8:10, lb. per acre.	Fredericton, N.B. (Potatoes).			Kentville, N.S. (Oats).					
								Duplicate.		Average	Straw. Duplicates		Straw. Average	Grain. Duplicates.		Grain. Average
	lb.	lb.	lb.	lb.	lb.	lb.		bush.lb.	bush.lb.	bush.lb.	lb.	lb.	lb.	bush.lb.	bush.lb.	bush.lb.
1	62·5	50	....	266·5	....	100	500	222–40	274	248–20	2,715	2,797·5	2,756·2	51–6	61–1	56–3$\frac{1}{3}$
2	62·5	50	....	....	266·5	100	500	227	231–20	229–10	2,962·5	2,460	2,711·2	54–1$\frac{1}{2}$	51–6	52–20
3	....	....	215	233·5	....	100	500	254–40	211	232–50	2,505	2,527·5	2,516·2	56–16	58–0$\frac{1}{3}$	57–8
4 *	....	....	215	233·5	....	100	500	....	....	....	2,700	2,550	2,625	66–6	66–6	66–6
5	....	....	215	....	233·5	100	500	251	230–40	240–50	2,212·5	2,377·5	2,295	54–$\frac{1}{2}$	58–0$\frac{1}{3}$	56–1
6	31	25	10	117	116	100	500	256	327–20	291–20	3,045	2,797·5	2,921·2	63–18	54–16	59
7	94	75	....	....	400	150	750	195	320	257–50	3,157·5	3,007·5	3,082·5	52–24$\frac{1}{2}$	52–24$\frac{1}{2}$	52–24$\frac{1}{3}$
8	....	....	323	....	350	150	750	242–40	242	242–20	2,992·5	2,760	2,876·2	61–33$\frac{1}{2}$	59–4	60–18
9	....	....	430	....	467	200	1,000	....	....	....	3,307·5	2,820	3,063·7	68–5	60–15	64–10
10	....	....	430	467	....	200	1,000	....	....	....	2,737·5	2,610	2,673·7	67–9	64–14	65–28
11	125	100	....	533	....	200	1,000	....	....	....	3,120	3,307·5	3,213·7	60–15	61–18$\frac{1}{2}$	60–34
12	62	50	216	234	232	200	1,000	292	331–40	311–50	....	....	....	43–8	....	....
13. No fertilizer	....	....	....	....	....	....	....	135·40	175–20	155–30	1,702·5	1,680	1,787·4	46–33	45–30	45–12
Average of plots fertilized	....	....	....	....	....	....	....	....	....	256–51	....	....	2,794	....	....	59–3
Average of plots not fertilized	....	....	....	....	....	....	....	....	....	155–30	....	....	1,787·4	....	....	45–12

* Limed at the rate of 2,000 pounds per acre.

DISCUSSION OF RESULTS.

(1) The fertilizers applied gave in every instance an increased yield, that is, a yield over and above the yields from the check (unfertilized) plots. This is true alike for both potatoes and oats, the maximum increase being practically 100 per cent in potatoes and 50 per cent in oats.

(2) These increased yields, however, bear very little relation to the amounts of the fertilizer applied. The very heavy dressings, at the rate of 1,000 pounds per acre, have not, in the larger number of instances, given yields in excess of those from 500 pounds, and we are quite safe in saying that the results of these experiments point to an application of the latter amount as far more profitable than heavier dressings. In no case has the return from the application of 750 and 1,000 pounds been such as to warrant the increased expenditure of fertilizer.

(3) Remembering that, in experiments of this character, it is not advisable or safe to make deductions as to the relative efficiency of any particular fertilizer when the yields do not differ to a degree of more than 10 per cent from the general average, the constancy or close agreement of the averages of yields from the fertilized plots is significant. The average yield from the fertilized plots of potatoes is 257 bushels, the limits being 229 and 311; and of oats, 59 bushels, with limits of 52 and 66.

It would seem, therefore, that the maximum possibilities, under the conditions of soil and season obtaining, had practically been attained by an application of 500 pounds per acre.

(4) For the potato crop, the results from plots 6 and 12 indicate an advantage in furnishing the fertilizing elements in a mixture of various forms and, though not conclusive, the liming of the land at Kentville for oats has been beneficial.

(5) The value of dogfish scrap as a source of nitrogen, both for potatoes and oats, has been established. It is possible that in the succeeding years of the rotation, this material may give still further evidence of its efficiency, as it is not probable that more than one-third or one-half of its nitrogen becomes available the year of its application.

(6) This experiment has not afforded any emphatic evidence as to the relative merits of the various forms of nitrogen and phosphoric acid employed, probably by reason of the fact already referred to, that 500 pounds, the lowest application made, has afforded the maximum of plant food usable by the crops under the conditions of soil and season that obtained.

(7) It would seem probable that an application of less than 500 pounds per acre, say 350 or 400 pounds, might have given a more profitable return on both crops.

(8) The experiment has not afforded any data to support the view widely held in the Maritime Provinces that a fertilizer of the formula 4:8:10 is the best for potatoes, and previous work has indicated that such a fertilizer is unnecessarily high in potash.

EXPERIMENT II.

To ascertain the Influence of Fertilizer Residues on the Crop of the Second Season. Potatoes.

This experiment, conducted at Fredericton, N.B., consisted in again planting with potatoes the fertilized plots of 1913, but without any further application of fertilizer, the object being to ascertain what effect the residues of the fertilizers of the preceding year might have on the succeeding crop. Unfortunately, several of the most interesting of the plots of the series had to be dispensed with in 1914, owing to a re-arrangement of the land and fencing.

For the purposes of comparison, the yields for 1913 are included in the table of data.

TABLE II.—Influence of Fertilizer Residues on Crop of the Second Season. Fredericton, N.B. Potatoes.

Plot.	Nitrate of Soda.	Sulphate of Ammonia.	Super-phosphate	Basic Slag.	Bone Meal.	Sulphate of Potash.	Lime.	Yield per Acre.	
								1913 Fertilized	1914 no additional Fertilizer
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Bush.	Bush.
A	75	75	250	......	250	150	......	322	......
B	75	75	......	500	......	150	......	311	241
C	150	......	......	......	......	......	......	200	198
D	......	120	......	......	......	......	......	224	55
E	......	......	......	......	......	......	......	176	155·5
F	......	......	350	......	......	......	......	172	118
G	......	......	......	500	......	......	......	148	107
H	......	......	......	......	......	150	......	220	139
I	75	75	350	......	......	......	......	172	117·5
J	75	75	......	500	......	......	......	160	98
K	......	......	......	......	......	......	......	134	......
L	75	75	......	......	......	150	......	241	150
M	......	......	350	......	......	150	......	227	79
N	......	......	......	500	......	150	......	125	110
O	......	......	......	......	......	......	2,000	199	......
P	75	50	50	200	......	100	......	315	......
Q	75	50	50	200	......	60	......	320	......
R	75	50	50	200	......	30	......	299	......
S	......	......	......	......	......	......	......	192	......

The check plots are E., K., and S.

DISCUSSION OF RESULTS.

(1) The yields generally throughout the series are much lower than those of 1913, probably in large part due to the season of 1914 being less favourable for the potato crop.

(2) The residual effect of the fertilizers on the larger number of the plots is nil or negligible. One marked exception to this conclusion stands out, namely, plot B; and it is significant that this is the only plot of the series cropped in 1914 that had been treated with a complete fertilizer. The value of this increase, at least $20 per acre, should be added to the profits of 1913 on this plot.

EXPERIMENT III.

To ascertain the Value of applying Fertilizer to each Crop of the Rotation. Second Year: Oats.

This experiment, carried on at Kentville, N.S., is a continuation of the fertilizer work on the plots used at that Station in 1913, when the crop was potatoes.

The results now recorded, for the season of 1914, are for oats. The fertilizer scheme (see Table III) is identical with that of 1913. The several mixtures were broadcasted in the spring of 1914 before seeding, and harrowed in. The variety of oats employed was Abundance, sown at the rate of 2½ bushels per acre, together with common red clover 8 pounds, alsike clover 2 pounds, and timothy 8 pounds per acre.

It will be observed that this experiment differs essentially from Experiment II. in that the fertilizer treatment was repeated in 1914 for the second crop of the rotation. At Fredericton (Experiment II.) the second crop was grown without any additional fertilizer.

The data for this experiment are given in table III, which also furnishes information as to the value of the yield of each plot at 60 cents per bushel, the cost of the fertilizer, the net receipts per plot, and the profit (or loss) for each plot after deducting the cost of fertilizer.

TABLE III.—Results from applying Fertilizer to each Crop of the Rotation, Kentville, N.S. Second Year: Oats.

Plot.	Nitrate of Soda.	Sulphate of Ammonia.	Super-phosphate.	Basic Slag.	Bone Meal.	Sulphate of Potash.	Straw.	Grain.	Grain at 60c. per bush.	Cost of Fertilizer.	Net Receipts.	Profit over no Fertilizer. ($17·60)
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	bush.-lb.	$ cts.	$ cts.	$ cts.	$ cts.
1	150	......	350	......	......	150	2,135	54 29	32 70	12 28	20 42	2 82
2	150	......	......	500	......	150	2,160	48 8	28·88	12·53	16·35	−1 25
3	150	......	......	......	500	150	2,200	58 28	35·08	15·78	19·30	1 70
4	......	150	350	......	......	150	2,780	62 2	37·22	12·28	24·94	7·34
5	150	......	350	......	......	100	2,095	53 18	31·98	10·98	21·00	3·40
6	......	......	......	......	......	......	1,280	30	18·10	......	18 00	......
7[1]	150	......	350	......	......	150	2,160	48 8	34·88	7·56	27·32	9·72
8[2]	150	......	350	......	......	150	2,320	61 6	36·66	11·33	25·33	7·73
9	150	......	350	......	......	60	2,460	54 4	32·44	9·93	22·51	4·91
10	150	......	......	......	......	......	1,590	38 18	22·98	4·88	18·10	0·50
11	......	......	......	......	......	......	1,000	32 12	19·32	......	19·32	......
12[3]	150	......	350	......	......	150	2,700	61 26	36·86	15·11	21·75	4·15
13	150	......	350	......	......	30	2,320	55 10	33·10	9·16	23.94	6 34
14	......	......	......	......	......	......	740	25 10	15·10	......	15 10	......
15	......	......	......	......	......	150	760	27 22	16·42	3·90	12·52	−5·08
16	150	......	350	......	......	150	2,560	68 28	41 08	11 75	29 33	11·73
17	......	......	350	......	......	......	1,160	30 20	18·20	3·50	14·70	−2 90
18	......	......	......	......	500	......	1,240	37 2	22 22	7 00	15 22	−2·38
19	......	......	......	......	......	......	780	30	18·00	......	18 00	......
20	......	......	350	......	......	150	1,860	45 20	27·20	7·40	19·80	2·20
21	......	......	......	500	......	......	860	33 18	19·98	3 75	16 23	−1 37
22	150	......	......	500	......	......	2,160	54 4	32 44	8 63	23 81	6 21
23	150	......	......	......	......	150	1,940	54 24	32 64	8 78	23 86	6·26
24	150	......	350	......	......	......	2,200	58 28	35 08	8 38	26 70	9·10

The average value of the crop from the four unfertilized plots is $17.60 per acre. The value of the fertilized plots, after deducting the cost of fertilizer, varies from $29.33 to $18.10. The maximum net profit from the use of fertilizer is $11.73 (plot 16); it was obtained from an application of a complete fertilizer at the rate of 650 pounds per acre. The minimum net profit is 50 cents per acre (plot 10). Of the twenty plots fertilized, fifteen gave a profit and five showed a loss.

In table IV we present a comparative summary of the essential data of this experiment with those from the plots in the preceding year. The table also furnishes information respecting the profits and losses from the employment of any one element, any two elements, and from the use of all three elements, in the formula. For the purpose of comparison and study, similar data are included for the experiments at Fredericton, N.B., in 1913.

[1] Mixed and applied at rate of 400 pounds per acre.
[2] " " 600 " "
[3] " " 800 " "

Note:—The check plots (no fertilizer) are Nos. 6, 11, 14 and 19.

TABLE IV.—Profits and Losses from the Use of Fertilizers.

—	Kentville, N.S.				Fredericton, N.B.	
	Oats.		Potatoes.		Potatoes.	
	1914.		1913.		1913.	
Maximum net receipts	$29·33		$101·91		$124·37	
Average from check plots without fert'zer	17·60		58·14		61·60	
Maximum net increase ($) due to fertilizer	11·73		43·77		62·77	
" " (per cent) "	66·65		75·3		101·90	
	Profits.	Losses.	Profits.	Losses.	Profits.	Losses.
	p.c	p.c.	p.c.	p.c.	p.c.	p.c.
Using any one Element.						
					15·0	
Nitrogen only	2·8		30·1		30·8	
Phosphoric acid only		7·8	7·9			5·7
		13·5	14·7			23·2
		16·5	41·2			
Potash only		28·8		3·4	33·7	
Lime only					2·7	
Using any two Elements.						
Nitrogen with phosphoric acid	35·3		10·85			19·3
	51·7		33·9			28·3
Nitrogen with potash	35·6		32·5		42·9	
Phosphoric acid with potash	12·5		9·9		15·4	
					29·4	
Using all three Elements.						
	9·6	7·1	6·4		78·15	
	16·0		8·4		87·5	
Nitrogen with phosphoric acid and potash	19·3		11·7		93·15	
	23·6		14·8		96·0	
	27·9		40·5		101·6	
	36·0		45·0			
	41·7		54·7			
	44·0		59·2			
	55·2		60·3			
	66·7		63·4			
			75·3			

As in 1913, the results of the past season at Kentville, N.S., with potaoes show that the largest profits and the largest number of cases giving a profit, followed the application of all three elements of plant food. Nitrogen only gave a very small profit (2·8 per cent); phosphoric acid only resulted in losses on all three plots, ranging from 7·8 to 16·5 per cent; potash only (one plot) gave a loss of 28 per cent; nitrogen with phosphoric acid (two plots) gave profits 35·3 and 51·7 per cent; nitrogen with potash (one plot) gave a profit of 35·6 per cent; and phosphoric acid with potash (one plot) a profit of 12·5 per cent. Of the eleven plots with a complete (nitrogen, phosphoric acid, and potash) fertilizer, one only showed a loss, of 7·1 per cent; the remaining ten plots gave profits ranging from 9·6 per cent to 66·7 per cent.

Further, as in 1913, the largest profits have not invariably followed the application of the largest amounts of fertilizer. As already noted, the largest net profit was

from an application of 650 pounds per acre. The second largest profit was from 400 pounds per acre, and the third from 500 pounds per acre.

Experiment IV.

To ascertain the relative Values of the various Forms of Nitrogen and Phosphoric Acid in a Complete Fertilizer, with and without Lime.

This experiment, undertaken both at Fredericton, N.B., and Kentville, N.S., was inaugurated to obtain further data on the relative effects of various forms and amounts of the above elements, and to ascertain the value of lime in conjunction with the fertilizers. The results should be in a large measure comparable with those of experiment I, provided the soils on both areas are similar. This season (1914) potatoes were used as the crop, and it is the intention to continue the investigation on the area throughout a rotation of three or four years, to learn the influence of the fertilizer residues on succeeding crops.

At Fredericton, N.B., the plots, six in number, were in duplicate (twelve in all) and measured one-twentieth acre each. The arrangement of the plots was such that the duplicates were some distance apart. One-half of each plot was limed at the rate of 1 ton of air-slaked lime per acre. The series included, in addition, two check plots, to which no fertilizer was applied, but to one of which lime was added at the aforesaid rate.

At Kentville, N.S., the plots were similarly one-twentieth acre each. The soil is a light loam of poor quality; it had been in corn the previous season. For this corn crop, 400 pounds per acre of a complete fertilizer with the formula 4:8:10 had been used. The test crop employed this season (1914) as at Fredericton, was potatoes, the variety being Green Mountain. The season was favourable to this crop except in July, which was exceedingly dry. The soil was well cultivated, and moisture conditions were fairly good. The "stand" over the whole area was quite even, but the plants presented a stunted and starved condition. The crop was planted May 30 and harvested October 10. The plots were sprayed three times, once with Paris green and arsenate of lead, once with Paris green, arsenate of lead, and Bordeaux mixture, and once with Bordeaux mixture.

Table V presents the amounts of the several fertilizers employed and the results obtained.

TABLE V.—The Comparative Values of various Forms of Nitrogen and Phosphoric Acid. All the Plots save the checks, were supplied with potash.

Plots.	Nitrate of Soda.	Sulphate of Ammonia.	Superphosphate.	Basic Slag.	Bone Meal.	Muriate of Potash.	Lime.	Fredericton, N.B. (Potatoes)						Kentville, N.S. (Potatoes)					
								Duplicates.				Average.		Duplicates.				Average.	
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
I A	140	....	150	150	....	101·2	....	275	20	....		275	2	75	50	71	20	73	35
B	140	....	150	150	....	101·2	Limed	516		....		516		88	35	83	10	85	53
II A	....	105	150	150	....	101·2	....	474		....		474		72		67	20	69	40
B	....	105	150	150	....	101·2	Limed	288		....		288		76		96	40	86	20
III A	70	52·5	300	....	....	101·2	....	240	40	380		320	20	95	30	72		83	45
B	70	52·5	300	....	....	101·2	Limed	244	40	323	20	284		101	20	79	30	90	25
IV A	70	52·5	....	300	....	101·2	....	240	40	281	20	261		104	10	65	40	84	55
B	70	52·5	....	300	....	101·2	Limed	468		323	20	395	40	112	20	72	40	92	30
V A	50	37·5	....	....	240	101·2	....	240	40	218	40	229	40	73	40	64	40	69	10
B	50	37·5	....	....	240	101·2	Limed	184		365	20	274	40	86	40	70	40	78	40
VI A. No fertilizer	....	....	....	....	....	....	....	242	40	128		185	20	62	40	49	10	55	55
B. No fertilizer	....	....	....	....	....	....	Limed	458	40	357	20	408		71	20	63	50	67	35

DISCUSSION OF RESULTS.

The discrepancies or differences between duplicates are in many instances very large. This is true for both series, but especially is it the case with the results obtained at Fredericton. This absence of reasonable agreement is most unfortunate, for not only does it indicate lack of uniformity in soil conditions and unsuitability of the areas for experimental purposes, but it makes it exceedingly difficult to draw, with confidence, any conclusions as to the influence of the fertilizers on yields. A study of the table reveals that, in many instances, differences between duplicates are as large as those shown by plots under different treatments. Thus, the yields from the duplicate unfertilized plots at Fredericton show a difference of 114 bushels, 40 pounds; between the duplicate plots of III A the difference is 139 bushels 20 pounds, between the duplicate plots of III B there is a difference of 78 bushels 40 pounds and so on; whereas between different fertilizer treatments the yields may be much closer, as witness the average yields from III B and IV A, 284 and 261 bushels, respectively, a difference of only 23 bushels. Under these circumstances, deductions as to the relative efficiency of the various fertilizer mixtures, etc., must be made with great caution.

At Fredericton, liming increased the yields in four of the six groups, the largest increases from the trials in duplicate being from the unfertilized plots. Apparently lime alone may double the crop on the land of this area.

At Kentville, liming effected an increase in all six groups of the series, but the increases are not of the same magnitude as those at Fredericton.

It does not appear that liming materially increased the efficiency of any of the fertilizer mixtures used, for the increases following a continued treatment of fertilizer and lime are for the most part not larger than the increases that can be accounted for as due to the effect of the fertilizer plus that of the lime. Thus complete fertilizers yielded increases over unfertilized crops, as high as 260 per cent; lime alone (2,000 pounds per acre) as high as 220, and complete fertilizers plus lime as high as 280 per cent.

The yields throughout the series at Kentville are exceedingly poor, and the increases due to the application of fertilizer in the larger number of instances, have not been such as to furnish a profitable return on the outlay for the material.

A recapitulation of the data of table V is presented in table VI.

TABLE VI.—Summary of Yields from Experiment IV, at Fredericton, N.B., and Kentville, N.S.

	Fredericton, N.B. (Potatoes)				Kentville, N.S. (Potatoes.)			
	Not Fertilized.		Fertilized.		Not Fertilized.		Fertilized.	
	bush.	lb.	bush.	lb.	bush.	lb.	bush.	lb.
Not limed	242	40	275	20	62	40	73	35
	128	..	474	..	49	10	69	40
	...	..	330	20	..	..	83	45
	...	..	261	..	..	..	84	55
	...	..	229	40	..	..	69	10
Average	185	20	314	4	55	55	76	13
Limed	458	40	516	..	71	20	85	53
	357	20	288	..	63	50	86	20
	...	..	284	..	..	..	90	25
	...	..	395	40	..	..	92	30
	...	..	274	40	..	..	78	40
Average	408	..	351	40	67	35	86	45

At Fredericton, lime alone, using four plots, gave an increase of 222 bushels 40 pounds per acre; at Kentville the increased yield due to lime alone was 11 bushels 40 pounds.

The average increase in yield following the application of fertilizer alone, was, at Fredericton, 128 bushels 44 pounds per acre, and at Kentville 20 bushels 18 pounds per acre.

Comparing the yields from the plots with lime only with those from plots supplied with both lime and fertilizer, we find at Fredericton the average from the former (two plots only) is larger than from the latter (five plots). At Kentville, the plots furnished with fertilizer and lime gave an average increase of 19 bushels 10 pounds over the plots that were limed only.

Experiment V.

To ascertain the Influence of decreasing Amounts of Potash in a complete Fertilizer, on Potatoes.

This experiment had for its object the ascertainment of the influence of decreasing amounts of potash in a complete fertilizer on potatoes. It comprised four plots, including one unfertilized used as a check. The work was conducted at Fredericton, N.B.

The results, briefly, are as follows:—

Table VII.—Results of varying amounts of Potash in a complete Fertilizer on Potatoes.

Plot.	Application.	Fertilizer Formula.	Containing Potash.	Yield per Acre.
	lb.		lb.	bush.
1	1,000	4 : 8 : 10	100	275
2	1,000	4 : 8 : 6	60	305
3	1,000	4 : 8 : 3	30	254
4	No Fertilizer.			171

All the fertilized plots gave marked increases over the yield from the unfertilized plot ,but it seems quite probable, from the results of Experiment I at this Station that these increases might have been obtained with a smaller application than 1,000 pounds per acre. With respect to the value of different amounts of potash, it would scarcely be justifiable, considering the lack of uniformity in the soil over this area, to draw any inferences from the yields of plots, 1, 2, and 3. Possibly on all of them more potash was applied than could be profitably used, but these results certainly indicate that an application of more than 100 pounds of potash (K_2O) per acre is not required.

Experiment VI.

To ascertain the Value of Fertilizer on Turnips, at Fredericton, N.B.

The area, one acre, was planted with corn in 1913, and had been manured in the spring of that year with eighteen loads (35 bushels each) of horse manure and 468 pounds of a complete fertilizer of the formula 3·6:10:5·5, per acre. The corn stubble was ploughed in the autumn.

In 1914, sixteen loads of horse manure were thoroughly worked into the soil, and 300 pounds of basic slag, per acre, applied broadcast. On one-half acre, fertilizer was applied at the rate of 265 pounds per acre, made up of 40 pounds of nitrate of

soda, 40 pounds of sulphate of ammonia, 70 pounds of bone meal, 70 pounds of superphosphate, and 45 pounds muriate of potash. The remaining half-acre received no fertilizer.

The plot to which the fertilizer had been applied gave an increased yield equivalent to 43 bushels 20 pounds per acre. At 10 cents per bushel this increase was worth $4.34. The cost of the fertilizer per acre was $4.89.

Experiment VII.

To ascertain the Value of Fertilizer on Indian Corn, at Fredericton, N.B.

This land was newly broken and sown to oats in 1912. In 1913 it received twenty 35-bushel loads of horse manure and 860 pounds of a complete fertilizer (70 pounds of nitrate of soda, 70 pounds of sulphate of ammonia, 100 pounds of superphosphate, 100 pounds bone meal, 120 pounds muriate of potash, and 400 pounds basic slag) per acre. It was sown to turnips, the yield being 960 bushels per acre.

In 1914 the land was spring ploughed and sixteen 35-bushel loads of manure worked in. There was then applied 250 pounds per acre of a complete fertilizer (31¼ pounds of nitrate of soda, 31¼ pounds sulphate of ammonia, 156¼ pounds superphosphate, and 31¼ pounds of muriate of potash). This was drilled in with the corn planter. Longfellow was the variety of corn planted. The season, as a whole, was unfavourable for this crop.

The yield of corn from the fertilized area was at the rate of 7 tons 1,664 pounds per acre; from the unfertilized area, 7 tons 1,090 pounds.

The value of the 674 pounds increase on the fertilized area, at $3 per ton, would be $1.01, and the cost of the 250 pounds of fertilizer was $3.61.

Mr. Hubbard remarks: "The fertilizer had quite a marked effect in the early part of the season, and on the 1st August the appearance of the two plots would lead the observer to suppose that the fertilized area would give nearly double the crop of that without fertilizer. Afterwards, the crop evened up and no difference was apparent in height of stalk, number or maturity of ears, when the crop was harvested."

Experiment VIII.

To ascertain the Value of Fertilizer on Vegetable Crops, at Fredericton, N.B.

The following experiments to ascertain the effect of certain fertilizer mixtures on the growth of garden crops, were devised and carried out by Mr. W. W. Hubbard, Superintendent, Experimental Station, Fredericton, N.B. It is not to be assumed that the formulæ used are the best for the respective crops to which they were applied, nor that the amounts employed are those which might be expected to give the most profitable returns. The experiments are purely empirical in nature, and the results therefrom are to be regarded with that fact in mind Other formulæ and other amounts might prove more economical, that is, might show a larger profit from their use.

The land had been manured in 1913 with 20 tons of farm manure and 700 pounds of a fertilizer with the formula 2.75:10.6:8.3 per acre.

TABLE VIII.—Fertilizer Results with Beans and Peas.

Variety.	Length of Row.	Manure 30 tons per acre.	Manure 15 tons per acre 300 lb. super-phosphate, 120 lb. muriate of potash.	Increase in Yield.
BEANS.	Ft.	Yield—pecks.	Yield—pecks.	p. c.
Valentine Wax	66	5¾	8½	47·8
Wardwell's Kidney Wax	66	5½	6	9·1
Extra Early Valentine	66	5	5¾	15·0
Extra Early Refugee	66	5½	5¼	....
New White Seeded Stringless	66	4½	6	33·3
Kidney Rustless Golden Wax	66	3½	6¾	92·8
PEAS.				
Heroine	33	5½	6	9·1
Telephone	33	5	5	....
Gradus	33	2¾	4¼	54·5
Juno	33	4	3	....
Early Giant	33	2¾	3½	27·3
Quite Content	33	3	3	....

TABLE IX.—Fertilizer Results with Beets and Carrots.

Variety.	Length of Row.	Manure 30 tons per acre.	Manure, 15 tons. Nitrate of Soda. 130 lb. Superphosphate 433 lb. Muriate of Potash 117 lb. per acre.	Increase in Yield.
BEETS.	Ft.	Yield—lb.	Yield—lb.	p. c.
Ruby Dulcet	66	62·5	81·2	30
New Meteor	66	60·7	73·7	21·4
Early Blood Red	66	55·0	64·9	18·0
Black Red Ball	66	45·0	50·1	11·3
CARROTS.				
Imperial Nantes	66	118·5	145·9	23·1
Chantenay	66	105·8	126·8	19·9
French Horn	66	102·9	108·9	5·8

TABLE X.—Fertilizer Results with Celery and Onions.

Variety.	No. of Heads.	Manure 30 tons per acre.	Manure, 15 tons. Nitrate of Soda, 240 lb. Superphosphate, 480 lb. Muriate of Potash, 200 lb. per acre.	Increase in Yield.
CELERY.	Dozen.	Yield—lb.	Yield—lb.	p. c.
Improved White Plume	1	20·4	23·2	13·7
Giant Pascal	1	20·0	22·6	13·0
Evan's Triumph	1	16·0	19·0	18·8
White Plume	1	14·6	19·2	31·5
Noll's Magnificent	1	12·2	13·8	13·1
French Success	1	10·6	12·0	13·2
Paris Golden Yellow	1	11·4	10·0	....
ONIONS.	Length of Row. Ft.			
Danvers Yellow Globe	66	20·1	25·4	26·4
Baker's White Globe	66	20·4	24·2	18·6
Baker's Yellow Globe	66	20·5	22·2	8·3
Baker's Red Globe	66	18·9	22·1	17·0
Large Red Wethersfield	66	17·7	18·3	3·4
Saltzer's Giant Red Wethersfield	66	15·8	17·0	7·6
Johnson's Dark Red Beauty	66	7·9	12·2	54·4

TABLE XI.—Fertilizer Results with Tomatoes.

Variety.	Length of Row.	Manure, 30 tons per acre.			Manure, 15 tons. Nitrate of Soda, 120 lb. Superphosphate, 480 lb. Muriate of Potash, 168 lb. per acre.			Increase in Yield.
		Ripe.	Green.	Total.	Ripe.	Green.	Total.	
	Ft.	lb.	lb.	lb.	lb.	lb.	lb.	p. c.
Sunnybrook Earliana	66	87·1	48·5	135·6	102·9	56·0	158·9	17·2
Rennie's Extra Early	66	71·9	66·0	137·9	71·6	42·4	114·0	....
Northern Adirondack	66	30·7	53·3	84·0	69·2	93·0	162·2	93·1
Alacrity	66	49·0	31·0	80·0	83·9	39·0	122·9	53·6
Extremely Early	66	52·8	42·0	94·8	65·2	30·2	95·4	0·6
Florida Special	66	13·2	43·5	56·7	39·9	34·2	74·1	30·7
Prosperity	66	32·3	24·5	56·8	28·2	30·5	58·7	3·3
Johnson's Jack Rose	66	27·2	11·7	38·9	32·7	34·5	67·2	72·8
Trophy	66	17·1	49·3	66·4	13·2	10·0	23·2	....
Chalk's Early Jewel	66	9·5	22·0	31·5	11·2	46·2	57·4	82·2
Matchless	66	14·1	22·5	36·6	10·4	15·5	25·9	....

TABLE XII.—Influence of Fertilizers on Vegetables. Summary of Results.

No. of Varieties.	Kind.	Increase due to Fertilizer.
		p. c.
6	Beans	32·24
4	Beets	20·2
3	Carrots	16·3
7	Celery	13
7	Onions	19·3
6	Peas	11·0
12	Tomatoes	20·4
44		18·8

EXPERIMENT IX.

To ascertain the Value of Fertilizer on Mangels and Potatoes, at Agassiz, B.C.

This experiment was planned and conducted by Mr. P. H. Moore, Superintendent Experimental Farm, Agassiz, B.C. The main object in these trials was to ascertain the value of potash, applied with nitrogen and phosphoric acid, for the mangel and potato crops. No provision was made in the scheme to obtain information as to the best forms in which to supply the elements nor to learn the smallest amounts of each required; in other words, to obtain the maximum increase at the least cost. The results, however, are valuable as indicating the advantages of a complete fertilizer and the possible increases which may be obtained from its employment. It may be thought that the returns indicate the value of potash as against nitrogen and phosphoric acid, but such is not the case. Probably if nitrogen and, similarly, phosphoric acid, had been omitted on plots, as was potash, the results would have shown that these elements were equally valuable in increasing the yields.

The land was a rather poor sandy loam, and had been cropped for a number of years. Previous to 1910 it had been in grass for several years. In 1910 it was summer-fallowed. In 1911 it was sown to grain and seeded down with clover. In 1912 two crops of clover were cut and made into hay, and in the autumn of that year and in 1913 it was pastured. It was ploughed in the early fall of 1913, top-worked and again ploughed. In the spring of 1914 it was dressed with farm manure at the rate of 24 tons per acre, which was worked in with the disc harrow. The size of the plots was one-eighth acre each. The fertilizers applied and the yields obtained per acre are set forth in the following table:—

TABLE XIII.—Influence of Fertilizers on Mangels.

Plot.	Manure.	Nitrate of Soda.	Super-Phosphate.	Muriate of Potash.	Yield, 1914.		Average Yield 3 Years. 1912–14.	
	tons.	lb.	lb.	lb.	tons.	lb.	tons.	lb.
1	24	160	400	160	25	85	26	1,589
2	24	160	400	.....	22	32	25	333
3	24	.....	.....	.....	4	60	12	102
4	24	100	350	150	23	700		

TABLE XIV.—Influence of Fertilizers on Potatoes.

Plot.	Manure.	Nitrate of Soda.	Super-phosphate.	Muriate of Potash.	Yield, 1914.	Average Yield, 3 years. 1912–1914.
	tons.	lb.	lb.	lb.	tons. lb.	tons. lb.
1	24	160	400	200	11 1,472	11 84
2	24	160	400	....	9 888	10 176
3	24	....	....	....	7 1,684	8 1,383

The possible increases from the use of a complete fertilizer are:—

	1914.	Average for 3 Years.
	p. c.	p. c.
For mangels	521·4	122·3
For potatoes	41·0	27·0

GENERAL CONCLUSIONS.

From the experimental work of 1913 and 1914, the following conclusions, we think, may be fairly drawn:—

(1) That a judicious and rational use of fertilizers may, in a very large number of instances, be depended upon to yield a profit. Injudiciously applied a monetary loss may result.

(2) That with certain crops, especially potatoes and roots, the yield may be largely increased by fertilizers, frequently doubled. The profit obtained, over and above the cost of fertilizer, should always be calculated by the farmer, and not merely the increase in yield noted. This is only possible when the crop is also grown, harvested and weighed from a plot similar in size and condition of soil, but to which no fertilizer has been applied.

(3) That, in general, it is advisable to use a complete fertilizer; that is, one supplying nitrogen, phosphoric acid, and potash.

(4) That fertilizers give increases in crop yields on many types of soil; even those soils which are considered fairly rich frequently yield increases, though these increases may not in all cases show a profit after deducting the cost of the fertilizer.

(5) That large dressings of fertilizer do not necessarily mean large increases in yield or large net profits. In our experiments with potatoes, the profitable application has seldom exceeded 400 pounds per acre. For many field crops the profitable amount and kind of fertilizer has yet to be ascertained.

(6) That the manipulation of fertilizer formulæ to meet the specific requirements of certain crops, as frequently practised and advertised by fertilizer manufacturers, is of little significance. It is unscientific and unnecessary. In general farm practice this manipulation, in fact, has no bearing or application, since the amounts of all the several ingredients, nitrogen, phosphoric acid and potash applied are, as a rule, in excess of the minimum requirements for a profitable return.

DEDUCTIONS AFFECTING FUTURE EXPERIMENTAL WORK WITH FERTILIZERS.

The following paragraphs have been written with the view of furnishing the farmer with certain information of a fundamental character respecting the fertilizer problem and its solution.

1. The object of rational experimental work with fertilizers is to devise and establish methods of procedure which will result in showing how the largest profits may be obtained at the minimum expenditure for fertilizer. Such a plan has been worked out for future employment on several of the Dominion Experimental Farms and Stations.

2. With "money" crops, such as potatoes, vegetable and market garden crops, the plan of investigation need not make provision for work of a very detailed or exact nature, for our results go to show that for these it is a tolerably safe investment to apply on land below its maximum producing power, 400 to 600 pounds of any rationally compounded complete fertilizer. But with crops of a low money value, per acre yield, such as grasses, cereals, forage crops, etc., the case is different; for these the greatest care and exactness in experimentation is demanded. A difference here in cost of fertilizers of $2 per acre may turn what might have been a profit into a loss.

3. In all cases the following requirements are to be studied: (a) the best forms, or mixtures of forms, in a complete fertilizer; and (b) the smallest amount of each element needed for the maximum increase of yield. This latter, for convenience, may be called the "minimum" of each element.

4. Comparisons of economic value can only be made at the minimum, and this is ascertained by finding the amounts and costs of the various ingredients necessary to give the largest net profits.

THE INFLUENCE OF LIMING ON THE PRODUCTIVENESS OF CERTAIN SOILS.

In several of the past reports of this Division, and still more fully in the recently issued bulletin "Lime in Agriculture," we have explained the function and value of lime and certain lime compounds, such as marl and finely-ground limestone, in soil improvement. For this reason it will be unnecessary here to enter upon any discussion respecting the many ways in which a rational employment of these lime compounds may vastly increase the productiveness of many soils, chemically, physically, and biologically. As an illustration of the practical value of liming, however, we consider that the citation of our experience in this matter on one of the Experimental Stations will be read with interest and profit by many farmers.

In 1913 it was reported from the Experimental Station at Cap Rouge, Quebec, that the wheat, oats, and barley on the trial plots had proved a complete failure, which could not be attributed to adverse weather conditions. A careful study of the conditions and circumstances made it probable that the difficulty or cause of failure was due to a lack of available lime in the soil. It was, therefore, determined to analyze samples of soils from two of these affected plots and if a deficiency of lime were indicated, to make a practical trial with liming towards their improvement. Our report on these soils, made in February, 1914, together with the deductions from the analytical work on samples collected in August, 1913, is as follows:—

The area from which these two soils were taken had been under cultivation for a very long period, probably over 100 years. It is considered very fairly uniform throughout. Immediately previous to the purchase of the farm by the Dominion Government it had carried two rotations each of four years of corn, oats, clover, and timothy. In 1911, the first year of its cultivation as part of the Experimental Station, it bore a crop of Indian corn; similarly, in 1912, it carried a corn crop. It received an application of 25 tons of cow manure in the spring of 1911, and a like application in the spring of 1912.

In 1913, the area was in part devoted to the growing of cereals in plots under the direction of the Dominion Cerealist. The complete failure on the barley and wheat plots led to the present investigation, which was to learn whether the soil, from one

cause or another, was specially deficient in any element of plant food, or possessed any property that might be injurious to crop growth.

The wheat was sown April 29, and the barley on April 30. The seed showed a low germinative power, from 57 to 75 per cent. On May 8, 10, and 11 the temperature fell to 30 degrees F. and to 25 degrees and 27 degrees, respectively, on the 15th and 16th, injuring the young plants. The crop on the "oat plots looked fair to excellent," but on the wheat and barley plots it was almost a complete failure, there being a very sparse stand of badly stunted plants, for the most part immature and with very few and small heads.

The two samples examined are from plots sown to wheat and barley, respectively, being collected in August, 1913, to a depth of 6 inches. It is stated that the soil shows no marked difference in appearance to a depth of 15 inches or more, and that it is underlaid by shale.

The soils are quite similar in general character, and might be described as silty loam. There is a fair proportion of sand and a little clay, the whole making a soil of medium texture, friable, and of fairly satisfactory tilth for most crops. Both contain fragments of shale or slate (showing their origin), and, judging from appearances, both are fairly well supplied with vegetable matter, the "wheat" soil being apparently somewhat the better in this respect. To one accustomed to the critical examination of soils they would probably be adjudged as of fair or medium productiveness, soils capable of some improvement towards mellowness, but which, under favourable seasonal conditions and suitable cultivation, might be expected to give very fair crops.

Both soils were distinctly though not excessively, acid.

The soils were submitted to a thorough chemical examination, and the following data obtained:—

Analysis of (air-dried) Soils from Wheat and Barley Plots, Experimental Station, Cap Rouge, Que.

—	No. 15392 Wheat.	No 15393. Barley.
Moisture	9·15	4·11
Organic and volatile matter	10·48	9·69
Mineral matter, insoluble in acid (clay, sand, etc.)	65·07	68·74
Oxide of iron and alumina (Fe_2O_3, Al_2O_3)	12·89	15·0
Lime (CaO)	·19	·19
Magnesia (MgO)	1·23	·97
Phosphoric acid (P_2O_5)	·20	·19
Potash (K_2O)	1·02	1·28
	100·23	100·17
Nitrogen	·305	·275
Available constituents:		
Lime	·097	·072
Phosphoric acid (P_2O_5)	·041	·039
Potash (K_2O)	·013	·015

DEDUCTIONS FROM ANALYTICAL RESULTS.

The data throughout show that in all essential characters these soils are very similar, indicating that the area from which they were collected is fairly uniform as to chemical composition.

The soils are well supplied with organic matter and nitrogen, in this important respect equalling many of our eastern soils with a good record for productiveness.

In phosphoric acid the content is quite satisfactory, the larger number of arable soils possessing between ·15 and ·25 per cent of this element.

The high percentages of potash present indicate the origin of these soils—shale or clay. In the majority of light and sandy loams, this element usually falls between ·25 and ·50 per cent.

In lime the soils are distinctly poor. This is a very unfavourable feature, indicating not merely an inadequate supply for the crop's needs, but also a condition of the soil that would be unfavourable to nitrification and lead to acidity. In this connection it may be noted that the magnesia content is higher than that of the lime, a feature or condition considered by many agricultural chemists as detrimental to luxurious growth of most farm crops.

The percentages of "available" constituents are those obtained after digestion of the soil with a 1 per cent citric acid solution, and may be regarded as representing the amounts of the several elements determined which are more or less readily available for plant growth.

The amount of "available" phosphoric acid in soils of average fertility usually lies below ·03 per cent; we may therefore conclude from the data obtained that these soils do not exhibit any marked deficiency in this element, at all events for cereal crops.

The percentage of "available" potash, though perhaps not so high as might have been expected in soils showing such a large amount of "total" potash, is not such as to indicate the immediate need of a potassic fertilizer to meet crop requirements.

The very small percentage of "total" lime present has already been commented on; the data give evidence that the proportion which may be considered soluble and available is exceedingly small.

Summing up these conclusions, we may say that, as regards organic matter, nitrogen, phosphoric acid, and potash, these soils are not poor; indeed as regards the essential elements of fertility they possess amounts, both as reserve and in the more available condition, quite equal to those in many soils of average fertility.

It is equally clear, however, that they are markedly deficient in lime, and this fact may account for their acidity and their lack of productiveness.

LIME REQUIREMENTS.

To obtain further evidence as to deficiency in lime in these soils, they have been submitted to two methods of examination recently proposed to determine the amount of lime that it might be necesary to add to a soil to bring about a favourable condition for crop growth. This has been termed the soil's lime requirement. The data are as follows, the calculation being made for 2,000,000 pounds of soil, the weight per acre of a surface layer 7 to 9 inches deep:—

——	No. 15392, "Wheat."	No. 15393, "Barley."
	Lime—lb.	Lime—lb.
By Calcium acetate method	7,596	8,928
Albert's method (modified)	8,512	9,295

Though our knowledge respecting these methods as indicative of a soil's need of lime is extremely limited, we may, it is thought, safely conclude that the above results point to the desirability of furnishing lime in liberal amounts; they strengthen the

deductions made from the analytical data, that these soils are very poor in available lime. to which condition their acidity and the crop failure may be due.

In reporting these results to the Superintendent at Cap Rouge, we recommended a treatment of this area with lime, say at the rate of 2 tons per acre, a strip of the land to be left untreated for the purpose of learning the influence of the lime. "The lime should be put out on the land as early as the season will permit in heaps says of 50 pounds each, and covered with moist earth. In ten days or a fortnight the lime should have become thoroughly slaked, when it may be spread, selecting a calm day for this operation. Assuming that the land was ploughed last fall, all that is necessary or desirable to incorporate the lime with the soil will be to harrow in. If the area was not ploughed last autumn, it would be well to plough this spring before the application of the lime, the subsequent operations being carried out as already indicated."

"Lastly, there is a reasonable doubt that this area is not effectively drained. If such prove to be the case, tile drainage should be put in, as the beneficial influence of the liming will not be fully secured in poorly drained land. Soil of the character under discussion, it may be remarked, requires good and effective drainage; possibly almost to the same degree as does a more heavy loam."

In November, 1914, the Superintendent reported the results of liming certain plots in this area in the spring of that year, the lime being applied at the rate of 2 tons per acre. The crops under trial were oats, barley, wheat, peas, carrots, mangels, sugar beets. The plots of cereals were one-sixtieth acre, and of roots one-fiftieth acre. One of three plots for each cereal was limed, and one of two plots for each class of roots was similarly treated.

The yields from the limed and unlimed plots carrying barley, oats, wheat, and peas are tabulated as follows:—

Influence of Liming on Crop Yields, Cap Rouge, Que., 1914. Grain, Pounds per acre.

	Plot 1 Limed.	Plot 2 Unlimed.	Plot 3 Unlimed.	Plots 2 and 3 Average.
Barley—				
Manchurian	1,200	240	540	390
O.A.C. 21	1,320	210	240	225
Success	1,380	420	240	330
	3,900	870	1,020	.....
Oats—				
Banner	1,980	1,860	2,040	1,950
Daubeney	2,040	2,220	1,740	1,980
Eighty Day	1,560	1,980	1,260	1,620
Gold Rain	2,340	2,280	1,980	2,130
Victory	2,220	1,080	1,440	1,260
	10,140	9,420	8,460	.....
Wheat—				
Early Red Fife	1,140	1,560	840	1,200
Huron	1,620	1,740	1,560	1,650
Marquis	720	600	120	360
Red Fife	720	90	120	105
	4,200	3,990	2,640	.....
Peas—				
Arthur Selected	1,680	840	1,080	960
English Grey	2,100	390	960	675
Golden Vine	1,380	1,320	840	1,080
Prussian Blue	1,920	540	1,020	780
	7,080	3,090	3,900	.....

Barley.—It will be observed that the yield on the limed plot is practically four times that on the unlimed areas. These results are most marked in character, and emphasize the value of lime on this soil for this crop.

Oats.—It would appear from the data that this crop is not as seriously affected as barley by a sour condition of the soil or a deficiency of available lime. The lime plots do not throughout the series invariably give an increased yield; nevertheless, the results as a whole may be considered as indicating that lime, to a certain degree, has been beneficial.

Wheat.—The yields from the plots of this series show that liming has not been uniformly beneficial. We find, however, that the increases due to the application of lime are, in several instances, most marked, and the "totals" from the limed as compared with those from the unlimed areas, certainly would lead one to conclude that an improvement for this crop had been brought about by liming.

Peas.—The results for this crop are almost equally as emphatic for the value of liming as those from barley. On the limed areas the yields are practically double those on the unlimed.

Roots.—The crops on the unlimed plots of carrots, mangels, and sugar beets made such a very poor "stand" that the plots were ploughed and sown to white turnips, which gave a fair crop. This would indicate that this latter crop is better able to withstand sourness or a deficiency in lime than the other farm roots.

The yields for the limed plots sown with carrots, mangels, and sugar beets are as follows:—

Yield from Limed Plots—Carrots, Mangels and Sugar Beets—per acre.

Variety.	Plot 1.	Plot 2.
	lb.	lb.
Carrots—		
Giant White Vosges	11,200	11,600
Improved Short White	7,000	13,200
Mammoth White Intermediate	13,900	10,200
Ontario Champion	8,500	10,400
White Belgian	11,000	6,500
Mangels—		
Danish Sludstrup	23,100	19,400
Gate Post	14,800	21,900
Giant Half Sugar White	23,200	17,800
Giant Yellow Globe	1,600	13,800
Giant Yellow Intermediate	22,400	26,700
Golden Tankard	14,800	10,300
Mammoth Long Red	17,200	19,000
Perfection Long Red	10,400	24,800
Prize Mammoth Long Red	15,600	20,200
Selected Yellow Globe	7,900	23,200
Yellow Leviathan	20,500	22,500
Sugar Beets—		
French Very Rich	2,000	9,000
Klein Wanzleben	10,400	10,000
Vilmorin's Improved A	10,800	10,400
Vilmorin's Improved B	10,200	10,800

When it is considered that the crops on the unlimed area were so poor that they were judged a "complete failure," the value of liming on this soil for the several classes of roots just enumerated will be apparent, for the above yields are, on the whole, if not large, fairly satisfactory under the circumstances.

Swedish Turnips.—This crop, from the present results, does not appear to be adversely influenced by soil conditions such as we are now considering; or, in other words, liming has not increased the yield of this farm root. If this is confirmed by future work, the deduction may prove of value to those whose land is deficient in lime, and who cannot, for the time being, supply the deficiency.

YIELD from Limed and Unlimed Plots, Swedish Turnips—pounds per acre.

Variety.	Limed.		Unlimed.	
	Plot 1.	Plot 2.	Plot 1.	Plot 2.
	lb.	lb.	lb.	lb.
Bangholm selected	49,700	47,700	55,300	45,400
Canadian Gem	53,200	61,600	56,600	51,500
Corning's Lapland	59,000	56,200	62,700	61,300
Good Luck	64,900	67,800	61,800	65,300
Halewood's Bronze Top	31,500	61,900	50,900	50,600
Hall's Westbury	48,100	48,800	53,000	31,000
Hartley's Bronze Top	53,200	51,600	57,500	42,600
Hazard Improved	50,200	61,900	48,600	54,900
Jumbo	52,300	56,500	47,800	54,900
Magnum Bonum	56,500	69,400	62,400	62,600
Mammoth Clyde	62,200	56,800	66,800	55,300
New Century	50,400	55,700	51,600	64,500
Perfection	66,400	54,300	57,200	56,600

This work as to the value of liming will be continued. The cereal plots have been seeded with timothy and clover, so that the influence of lime on the hay yield will be obtainable this season, 1915. The experiments with farm roots on limed and unlimed areas will also be continued. The influence of liming may be gradual, on certain soils it may not be fully evident in the year of application. The carrying on of the investigation, using the areas now under experiment, may therefore give still further valuable results.

FERTILIZING MATERIALS.[1]

Under this caption we present the analysis of a number of materials examined during the past year as to fertilizing value. These include limestones, marls, wood ashes, mucks, peats, river and tidal muds, etc., and certain by-products from manufacturing processes containing plant food. There are many substances occurring in Canada which may be used for soil improvement, and which frequently can be obtained at little cost; it is to furnish farmers with information respecting their agricultural value and use that this Division has year by year analysed and reported upon samples of this character submitted from various parts of the Dominion.

LIMESTONE.

The functions of lime, ground limestone, and marl as amendments of very considerable agricultural value have been discussed in several of the more recent annual reports of this Division and in Bulletin No. 80, issued in the early months of the present year, the whole subject in all its phases has been very fully considered. It will therefore be unnecessary to enter upon details as to the use and purpose of these materials in agriculture. It may, however, be noted that within the past two years

[1]Farmers and others may be again reminded that the analysis of commercial fertilizers as sold in Canada does not come within the scope of the work of this Division. Matters relating to alleged adulteration of these fertilizers should be referred to the Inland Revenue Department, Ottawa, the branch of the Government service that administers the Fertilizer Act in Canada.

there has been an ever-increasing interest on the part of farmers throughout the Dominion in the use of lime compounds, and that there is at present a widespread inquiry as to their place in rational farming for improvement of soils and the increase of fertility. To all who seek information on this important subject we recommend the reading of the special bulletin already referred to.

The larger number of samples of limestone and crushed or pulverized limestone examined during the year have been submitted by the Department of Agriculture of the province of New Brunswick. In February last, Mr. R. Newton, Director of Agricultural Schools, Woodstock, N.B., wrote us: "The deficiency in lime in many of our New Brunswick soils is serious enough to constitute an important problem. Since pulverized limestone has been found just as effective as burnt lime, as well as a cheaper and more advantageous form to use, and as limestone deposits are widely distributed over the province, the Department of Agriculture, New Brunswick, has purchased a first-class portable pulverizing plant, which will be used to make demonstrations in the production of this material in as many localities as possible during 1915. A charge will be made to cover the operation of the machine during the actual process of pulverizing. The machine has a stated capacity of 2 to 3 tons per hour, depending on the hardness of the stone and the size of the pieces. We think it well to have analyses made of samples of stone submitted by parties applying for this machine before sending it to them. Would you be good enough to do this analytical work for us, and if so to what extent may we call upon you?"

We replied that we should be glad to assist in this matter as far as time at our disposal permitted, and, it may be added, many samples of limestone have been received from this source. The analyses of those examined to date are herewith given.

Laboratory No 16314.—Limestone, No. 1, from Sussex, Kings Co., N.B.

Laboratory No. 16315.—Limestone, No. 2, from Florenceville, Carleton Co., N.B.

Analysis—	No. 16314. Per Cent.	No. 16315. Per Cent.
Moisture	·11	·13
Mineral matter insoluble in acid	8·63	13·73
Oxide of iron and alumina	2·92	3·22
Carbonate of lime	78·65	79·73
" magnesia	7·98	3·42

In carbonate of lime content there is little to choose between these two samples, so that for agricultural purposes—to be used as ground limestone—they may be considered as of practically equal value. They are not of the highest grade, but of fair quality. The percentage of magnesia is not excessive.

Laboratory No. 17104.—From College Bridge West, N.B.

This sample consisted of fragments of a chocolate-red rock, quite hard and having the appearance of slate or shale.

Analysis—	Per Cent.
Mineral matter insoluble in acid	75·12
Oxide of iron and alumina	14·84
Lime[1]	1·44
Potash	1·04
Phosphoric acid	·40

[1] Equivalent to carbonate of lime 2.57 per cent.

It was claimed that this rock weathered easily, becoming reduced to the form of powder by the frost and rain, and that, applied to land, it encouraged the growth of clover.

The analysis shows that this is not a limestone. The small proportions of such plant food as it contains are in all probability in such an unavailable condition that

the value of the material as a fertilizer is negligible. It is extremely doubtful, even if the rock were finely crushed, whether a profitable return would be obtained from its use.

Laboratory No. 20222.—From deposit on farm of T. Barnes, Sussex, N.B.

Analysis—	Per Cent.
Mineral matter insoluble in acid	7·26
Oxide of iron and alumina	3·20
Carbonate of lime	83·45

This is a very good limestone and one quite suitable for agricultural purposes. This rock was subsequently pulverized by the Sussex and Studholm Agricultural Society.

Laboratory No. 20267.—From deposit on farm of John Hughes, Petitcodiac, N.B.

Analysis—	Per Cent.
Mineral matter insoluble in acid	2·18
Oxide of iron and alumina	3·47
Carbonate of lime	94·1

This is a limestone of excellent quality and would prove very satisfactory for agricultural use.

Laboratory No. 20346.—Sent as crushed limestone from St. John, N.B.

Analysis—	Per Cent.
Mineral matter insoluble in acid	77·06
Oxide of iron and alumina	11·30
Carbonate of lime	5·12

The firm grinding this material, it is stated, consider that it is valuable as a fertilizer on account of its supposed potash content.

It is not a limestone, though it contains some five per cent of carbonate of lime. No doubt, as alleged, it would contain some potash, but this will exist in such an inert and insoluble condition that it would not be more available than that of the potash minerals naturally present in the soil. It is evidently in the same class as the so-called "stone meal" and "mineral fertilizers," which we have reported on (Report Division of Chemistry, 1911) and which cannot be considered as fertilizers in the correct meaning of the term. At the best, they could only act as amendments. From any standpoint their monetary value must be exceedingly small.

Laboratory No. 20663.—Pulverized Limestone from Sussex, N.B.

Analysis—	Per Cent.
Mineral matter insoluble in acid	3·43
Oxide of iron and alumnia	·48
Carbonate of lime	93·97
Undetermined	2·12
	100·00

Mechanical analysis—	Per Cent.
Passes 12-mesh screen	99·45
" 50 "	58·58
" 80 "	39·85

This is excellent as to quality, and quite satisfactory as to degree of fineness.

Laboratory Nos. 20666 and 20667.—From deposit on Daniel's Brook at the foot of Shepody mountains, Hopewell, N.B.

Analyses—	No. 1. Lab'y. No. 20666. Per Cent.	No. 2. Lab'y. No. 20667. Per Cent.
Mineral matter insoluble in acid	58·15	27·20
Oxide of iron and alumnia	6·05	3·80
Carbonate of lime	28·21	63·23
Undetermined	7·59	5·77
	100·00	100·00

No. 1 is a very poor limestone of inferior quality and not worth grinding. No. 2 is decidedly better, but of medium quality only.

Laboratory No. 20009.—Crushed limestone from Hull, Que.

Analysis—	Per Cent.
Mineral matter insoluble in acid	21·64
Oxide of iron and alumina	3·14
Carbonate of lime	70·82
Undetermined	4·40
	100·00

Mechanical analysis—	Per Cent.
Passes 12-mesh screen	26·0
" 50 "	4·0
" 80 "	3·0

This is not a limestone of the first quality, but nevertheless is one that could be used to advantage for agricultural purposes. The material is very much coarser than the ground or pulverized limestone usually found on the market; finer grinding would undoubtedly enhance its value for immediate action in the soil.

Laboratory No. 20589.—Limestone forwarded from St. Marys, Ont.

Analysis—	Per Cent.
Mineral matter insoluble in acid	2·43
Oxide of iron and alumina	0·35
Carbonate of lime	90·88
Undetermined	6·34
	100·00

Limestones of the highest grade will contain from 95 per cent to 98 per cent of carbonate of lime. This sample, however, is above the average, and would furnish, when finely ground, an excellent material for the improvement of soils in need of lime.

Laboratory No. 19689.—Dark grey limestone, forwarded from Montague, P.E.I., but stated to be quarried in Nova Scotia.

Analysis—	Per Cent.
Mineral matter insoluble in acid	14·30
Oxide of iron and alumina	2·12
Carbonate of lime	82·00
Undetermined	1·58
	100·00

This is not a limestone of the first quality, but is of sufficient richness to furnish a material quite serviceable for agricultural purposes.

Laboratory No. 19600.—Designated "lime" and presumably produced by the incomplete burning of limestone No. 19689.

Analysis—	Per Cent.
Mineral matter insoluble in acid	17·62
Oxide of iron and alumina	5·07
Lime	54·41

The lime is present partly as oxide (quicklime) and partly as carbonate. Though not a good quality of lime, and quite unsuitable for the making of mortar, etc., it could be advantageously used for the treatment of land that would be improved by liming.

Laboratory Nos. 15670 and 15671.—From Tsinkut lake, B.C., and forwarded as specimens of the rock in the neighbourhood, supposed to be limestone.

Analyses—	No. 1. Lab'y. No. 15670. Per Cent.	No. 2. Lab'y. No. 15671. Per Cent.
Mineral matter insoluble in acid	61·09	64·63
Oxide of iron and alumina	17·57	16·15
Carbonate of lime	9·80	10·22
" magnesia	11·25	9·10
Undetermined	0·29	....
	100·00	100·00

The analyses accord so closely that we may conclude both specimens are from one and the same character of rock, impure and inferior limestone. The percentage of carbonate of lime is too small to make burning a practicable or profitable undertaking, but the crushed rock would be of some value to soils that are sour and deficient in lime.

Laboratory No. 17026.—From Hawkesbury, Ont. This limestone is a dark slate-coloured rock, quite hard and refractory.

Analysis—	Per Cent.
Mineral matter insoluble in acid	14·67
Oxide of iron and alumina	4·40
Carbonate of lime	76·52
" magnesia	3·51
Undetermined	0·90
	100·00

This is of inferior quality, but it is sufficiently rich in carbonate of lime to give it an agricultural value. Whether it could be profitably crushed would largely depend on local conditions—the cost of quarrying, grinding, etc. In cases such as this it is generally advisable, before commencing operations, to explore the neighbourhood further for a higher grade of limestone, for the selling price of the crushed product will naturally be largely regulated by its carbonate of lime content.

CRUSHED CLAM SHELLS.

Laboratory No 20474.—This material, it is stated, is manufactured and sold in New Brunswick for agricultural purposes. The sample analysed was forwarded for examination by a correspondent in Lower Woodstock, N.B.

Analysis—	Per Cent.
Mineral matter insoluble in acid	5·82
Oxide of iron and alumina	1·82
Carbonate of lime	81·30
Organic matter, etc., undetermined	11·06
	100·00

Mechanical analysis—	Per Cent.
Passes 12-mesh screen	97·50
" 50 "	0·50

The essential constituent of this material is carbonate of lime. It would be valuable for sour soils and those generally needing lime, but it is not sufficiently finely ground to be immediately effective. It is too coarse to be generally recommended, but no doubt could be profitably used if the price were correspondingly low.

WASTE LIME FROM MANUFACTURE OF WOOD ALCOHOL.

Laboratory No. 19433.—This material, as received, was of a yellowish-brown colour, somewhat moist, and with an odour of pyroligneous acid. It was forwarded from Monte Bello, Que., with a request for information as to its agricultural value.

Analysis—	Per Cent.
Water, at 212° F.	15·76
Loss on ignition, organic matter, etc.	8·17
Mineral matter insoluble in acid	7·46
Oxide of iron and alumina	9·71
Lime	36·88

This waste lime effervesces strongly on the addition of an acid, showing that a part of the lime at least is present in the form of carbonate. The partial conversion into carbonate may be due to exposure of the material to the air subsequent to its use in the manufacturing process.

There appears to be no reason why this waste or by-product could not be used as a source of lime for treating land, but it would be a useful precaution to expose the material on the surface of the land for some little time before harrowing it in.

WASTE LIME FROM BEET SUGAR FACTORY.

Laboratory No. 17078.—This sample of refuse lime was received in an air-dried condition as a friable, greyish-white mass; fresh from the factory it would contain a large percentage of water, which would necessarily reduce its lime content. The analysis was made at the instance of the Commission of Conservation, Ottawa.

Analysis—	Per Cent.
Moisture	3·33
Organic and volatile matter	14·13
Mineral matter insoluble in acid	0·86
Oxide of iron and alumina	3·44
Lime (CaO)	43·88
Magnesia (MgO)	1·88
Potash and soda (as chlorides)	0·84
Phosphoric acid (P_2O_5)	0·94
Sulphates (SO_3)	1·17
Carbon dioxide (CO_2)	29·54
	100·01
Nitrogen, in organic matter	·386

This material is essentially hydrate and carbonate of lime, and consequently would be found a useful amendment for all soils deficient in this element. In its air-dried condition it would appear to be a convenient and suitable form in which to apply lime to the soil.

In addition to the lime compounds it contains some 15 per cent of organic matter, holding ·386 per cent of nitrogen. This nitrogen, in all probability, would become available more or less readily for crop use. The product has, therefore, a certain small value as a nitrogenous manure.

Potash and phosphoric acid are present in amounts which, though not sufficiently large to be noted commercially, nevertheless, like the nitrogen, add to the agricultural value of the product.

INDURATED MARL.

Laboratory No. 19146.—From Sardis, B.C. This is a hard, rock-like material with a honeycombed structure. It occurs by deposition from the waters of streams and springs which are rich in carbonate of lime. Large deposits of this material occur in many of the valleys of British Columbia, and previous analyses have shown its composition as almost pure carbonate of lime. The present sample is no exception, and must be considered as a species of marl of excellent quality. If crushed it would be found a very useful source of lime for soils deficient in this element.

MARL.

Laboratory No. 17521.—From a large bed or deposit near Drummondville, Que. Analysis showed it to be of excellent quality, consisting essentially of carbonate of

lime. Its condition would permit of its easy application to the soil, being soft and friable. It would constitute an admirable material for soils that would be benefited by liming.

SOFT WOOD ASHES FROM MILL.

Laboratory No. 17724 A and B.—These ashes are from the furnace of a lumber mill in which waste wood is burnt, at Isle Verte, Que., and, as reported, they are thrown into a heap, exposed to the weather, or got rid of by throwing them into the river. Our correspondent stated that they could be obtained by farmers of the locality for the hauling, and wished to know if they were of any agricultural value, especially for sandy soils. Hitherto they had not been used, probably because their fertilizing value was unknown.

"A" Fresh ashes, as received, was in the form of a dry grey ash, with some fragments of charcoal.

"B" Exposed ashes, as received, was a greyish white mass of an earthy or ash-like appearance, quite moist, with some fragments of charcoal.

Analysis—	"A." Per Cent.	"B." Per Cent.
Water	0·36	30·81
Mineral matter insoluble in acid, clay, sand, etc.	56·35	25·05
Organic and volatile matter, charcoal, etc.	11·60	13·03
Lime, chiefly as carbonate	19·98	10·38
Phosphoric acid	0·64	0·82
Potash	1·91	0·85

Since the chief fertilizing element of value in these ashes is potash, sample "A" is much the better of the two. Further, this sample is richer in lime. Weight for weight, it would be approximately double the value of "B," which evidently has been seriously leached.

These ashes would undoubtedly be of very considerable value to sandy loams. The folly of allowing the ashes to be exposed to the weather is well shown by the analyses. They should be gathered while fresh, and kept protected from rain and snow until the farmer is ready to use them on his land. They would be found useful on sour soils and all those deficient in lime, and would be found more particularly useful for clover, alfalfa, roots, corn, and fruit trees.

For the purpose of comparison, it may be stated that good quality ashes from hardwoods contain from 4½ to 6½ per cent potash, and 1 to 2 per cent phosphoric acid.

Laboratory No. 19543.—This is a further sample of soft-wood ashes, and was produced by the refuse burner of a large mill near Bathurst, N.B. As received, the sample was fairly dry, of a greyish-brown colour, and contained a considerable amount of charcoal. There was apparently little or no admixture of clay or sand.

Analysis—	Per Cent.
Moisture	7·50
Organic and volatile matter, chiefly charcoal	23·04
Mineral matter insoluble in acid	14·98
Oxide of iron and alumina	12·72
Lime, chiefly as carbonate	23·79
Phosphoric acid	1·59
Potash	0·28

The value of these ashes as a potassic fertilizer is practically nil. The very low potash content points to the conclusion that the ashes have been very seriously leached. It is impossible to suppose that this sample represents the furnace ashes as produced. However, as analysed they have an agricultural value, chiefly for the lime they contain, and they no doubt would prove a useful amendment for soils in need of this element.

SOFT MAPLE ASHES.

Laboratory No. 16648.—Forwarded from Sardis, B.C., and stated to be from an ordinary "box" stove in which soft maple was being burnt. The sample was in the form of a clinker, having been fused.

Analysis—	Per Cent.
Mineral matter insoluble in acid	3·16
Lime, chiefly as carbonate	35·76
Phosphoric acid	2·71
Potash	19·19

These ashes contain an unusually high percentage of potash and, in consequence, possess a very considerable fertilizing value. We have not been able to find any record of the composition of the pure ash of soft maple, which we presume this is, so that we cannot say if these data are in any degree abnormal The analysis was carefully carried out, and there is no reason to doubt the accuracy of the results. At the present time, when the ordinary potash compounds have disappeared from the market, this analysis is of peculiar interest.

INCINERATOR ASHES.

Laboratory No. 17089.—From the city incinerator at Peterborough, Ont., and stated to be the fine ash obtained by screening the crude ashes.

Analysis—	Per Cent.
Moisture	3·48
Organic and volatile matter	10·73
Mineral matter insoluble in acid	48·62
Lime[1]	14·08
Phosphoric acid	1·87
Potash	1·75
Nitrogen	·192

[1]Equal to carbonate of lime, 25·14.

Incinerator ashes, as has been shown by previous analyses, are extremely variable in composition; very considerable differences have been found, week by week, in ashes from the same incinerator. The sample here reported on is one of the best, so far as potash is concerned, that we have examined; its agricultural value, nevertheless, is not high, and would not approximate that of good wood ashes. It could, however, be advantageously employed on many classes of soils, especially those in need of liming, provided it could be obtained at a sufficiently low cost.

PEAT ASHES.

Laboratory No. 18123.—These resulted from the burning of a deposit of peat from 6 inches to 1 foot in thickness, in the clearing of land near Aylmer, Que. As received they were a fine, dry, ash-like powder.

Analysis—	Per Cent.
Moisture	0·82
Mineral matter insoluble in acid	60·74
Oxide of iron and alumina	16·24
Lime, chiefly as carbonate	11·10
Phosphoric acid	1·56
Potash	0·38
Undetermined, charcoal, carbonic acid, etc	9·14
	100·00

Previous analyses of peat ashes resulting from the clearing of land furnished the following data, inserted here for the purpose of comparison.

	A. Per Cent.	B. Per Cent.	C. Per Cent.
Moisture	0·77	3·02	
Mineral matter insoluble in acid	77·83	73·55	
Oxide of iron and alumina	7·46	3·89	
Lime	6·40	7·00	21·75
Phosphoric acid	0·39	0·57	1·68
Potash	0·30	0·51	0·60

Though not equal to good wood ashes, either in potash or phosphoric acid, these peat ashes undoubtedly possess a very considerable fertilizing value, especially for light upland soils with a tendency to sourness through deficiency of lime, and for soils containing an abundance of vegetable matter.

SMELTER SLAG.

Laboratory No. 19693.—This is a sample of the slag from the smelter at Nelson, B.C. Our correspondent says: "Large quantities of this slag are available, and presumably the only expense would be transportation. If, like basic slag, it has any fertilizing properties, the information would be of interest and value to this community."

Analysis—

	Per Cent.
Silica	35·24
Oxide of iron and alumina	47·24
Lime	12·55
Phosphoric acid	·08
Potash	0·46

The amounts of plant food present are not such as to impart to the material any substantial value, and there are no indications that this slag could be put to any agricultural use, save perhaps for the lightening of heavy clay soils.

STONE MEAL.

Laboratory No. 18230.—The analysis of this material, manufactured by the Stonemeal Fertilizer Company, of North Patterson, N.J., was undertaken at the solicitation of the Commission of Conservation, Ottawa, to whom it had been sent for experimental purposes.

It is in the form of a very finely ground grey powder, insoluble in water. It effervesces strongly on the addition of acid, giving off carbon dioxide and sulphuretted hydrogen.

Under the microscope it is seen to contain particles of mica, quartz, and feldspar. Apparently it is a mixture of finely ground rock material, including apatite or native phosphate of lime.

Analysis—

	Per Cent.
Mineral matter insoluble in acid	44·42
Lime, present as carbonate, sulphate and phosphate	19·00
Magnesia	4·43
Potash	0·30
Phosphoric acid	5·55

It does not contain any immediately soluble and available plant food, and hence could not be classed as a fertilizer. Its only fertilizing constituent in notable amount is phosphoric acid, and this, by reason of its insoluble condition, would practically be of no immediate value to crops. It might be argued, of course, that this phosphoric acid would gradually become soluble and useful; in admitting this conclusion it may be pointed out that the conversion would be extremely slow. There is no reason to suppose that the change would be more rapid than that which takes place ordinarily in the

reduction of the soil's natural stores of this element, and the response in crop returns from its use as a phosphatic fertilizer would, we are sure, in the majority of cases be unnoticeable.

Possibly the material might exert a beneficial influence on the tilth of some soils by virtue of its carbonate of lime content.

POTASH FERTILIZER FROM FELDSPAR.

Laboratory No. 20097.—This product, made by heating together, in a blast furnace, feldspar, limestone, and iron ore, in suitable proportions, was forwarded from Queen's University, Kingston, Ont., with a request for a report as to its value as an agricultural source of potash. The process employed seeks to render soluble and available the insoluble and inert potash of the feldspar. It is further stated that lime, magnesia and other elements of plant food are thereby furnished in a soluble condition. The sample submitted was from a preliminary trial on a comparatively small scale and, in consequence, may not be entirely representative of the product as manufactured in commercial quantities and finally put on the market.

The examination of this material (which was in the form of fine powder) made in the Farm laboratories, was of a careful and exhaustive character, and had in view the determination of its potash content and more particularly the ascertaining of the probable availability for crop use of this potash, for, from the agricultural standpoint, the value of this product would depend entirely upon its percentage of available potash.

The solvents used in extracting the potash from the product were water, dilute citric acid, dilute hydrochloric acid, and strong hydrochloric acid, and the following data were obtained, the analysis being made in duplicate and, in some determinations, in triplicate.

Analysis—

Solvent—	Potash (K_2O) Per cent
Water	.048 traces.
Citric acid, 1 per cent solution	3.16 3.34 3.15
Hydrochloric acid, sp. gr. 1.115	4.40 4.43
Hydrochloric acid, strong	5.41

These data indicate the total amount of potash that may be considered as possibly in time becoming available (5.41 per cent), and the percentage of potash that might be viewed as of more or less immediate availability (3.34 per cent).

The potash, as found in this product, exists no doubt largely as silicates, regarding the availability or usefulness of which for plant nutrition there is very little on record. Some years ago, experiments were made in Germany with a crude potassium silicate, but the material was not put on the market, and inquiries concerning it were unsuccessful in eliciting any information as to the reason. It would seem, therefore, that field trials with this product would be necessary to establish its agricultural value.

The potash compounds used ordinarily in fertilizers, the muriate and sulphate, are easily and entirely soluble in water; the water-soluble potash in this material is present in traces only.

The citric-soluble potash, amounting to about three-fifths of the total potash present, or 3·21 per cent, is undoubtedly more or less available; the degree of availability, however, for the reason given in a preceding paragraph, would have to be determined by practical field tests, carried on possibly for a number of years.

Dilute hydrochloric acid extracts in the neighbourhood of 4·0 per cent potash, practicaly 1·0 per cent more than that taken out by dilute citric acid. The availability of this additional percentage is doubtful, but it is probably higher than that present in the potassic minerals generally found in soils.

From our knowledge of soils and plant requirements, the contention that this product has an additional value from the presence of soluble silicates of lime, magnesia, soda, and iron, carries little or no weight. Their value for increasing crop yields is purely conjectural; indeed the evidence of agricultural chemistry to-day is against attaching any importance to these compounds as fertilizers. The only exception might be lime, which, in the form of oxide and carbonate, is a well known amendment for certain classes and conditions of soils.

Probably this process of treating feldspar may be further perfected. Potash feldspar, known as orthoclase, exists in large deposits in several parts of Canada. It contains from 10 to 12 per cent of potash. If this can be made available for agricultural use at a reasonable cost, a profitable industry could, no doubt, be established at the present price of potash. It seems safe to conclude, however, that once the European war is over, the supply of potash compounds from the Stassfurt mines will again be available and the price of potash recede to that of *ante bellum* days. This event, it is probable, would make the commercial operation of such a process as the one here discussed, very difficult, if not impossible.

SPENT BONE.

Laboratory No. 16812.—This is a refuse or waste product from the glucose factory, being bone char or animal charcoal, after use in the purification of the syrup.

Analysis—	Per Cent.
Moisture	0·67
Mineral matter insoluble in acid	0·94
Phosphoric acid	30·30
Nitrogen	0·97

The phosphoric acid is equivalent to 66·15 per cent of bone phosphate.

This material is rich in phosphoric acid, and also contains a notable percentage of nitrogen. Unfortunately, its decay in the soil is very slow and the process whereby its constituents become available for crop use is, as a consequence, very gradual. For this reason it is seldom used in its untreated condition, but is more commonly employed for the manufacture of superphosphate.

DOG FISH SCRAP.

Laboratory No. 16975.—This is a sample of the product from the Dogfish Reduction Works at Canso, N.S. It is essentially a nitrogenous fertilizer, though also possessed of a notable amount of phosphoric acid and a little potash.

Analysis—	Per Cent.
Moisture	8·09
Nitrogen	9·46
Phosphoric acid	3·16
Potash	0·93
Total mineral matter (ash)	7·53
Oil	26·69

This fish scrap or refuse has been repeatedly analysed in the Farm laboratories, and the results published in the reports of this Division. The present data do not differ markedly from those previously obtained, though the nitrogen content is slightly above the average.

Although the nitrogen in this material cannot rank in availability with that of nitrate of soda or sulphate of ammonia, this product is undoubtedly a valuable nitrogenous fertilizer. The response from its use will depend largely on the character of the soil and of the season, and it would seem probable in many cases that its effect will be more noticeable on the crop of the second or even third year after its application than upon that of the season in which it is applied. It would be best suited to moderately light, warm, moist soils. If it could be prepared with a smaller percentage of oil, the constituent which retards its decay in the soil, the availability of its nitrogen would undoubtedly be more rapid.

POND MUD.

Laboratory No. 13922.—This fresh-water deposit, containing a few small shells and consisting essentially of clay or silt and fine sand, with a certain admixture of organic (vegetable) matter, was forwarded from Souris East, P.E.I. The correspondent writes: "Would this be of any value for poor land? I thought of using it as a top dressing on sod land, and also for potatoes and oats. My soil is a heavy clay."

In the air-dried condition its analysis afforded the following data:—

Analysis—	Per Cent.
Moisture	2·65
Mineral matter insoluble in acid	71·77
Oxide of iron and alumina	8·61
Lime (present as carbonate)	1·08
Phosphoric acid	0·28
Nitrogen, in organic matter	0·422

Though not very valuable, this deposit undoubtedly would be found of some benefit to poor land. It contains a certain amount of organic matter, and this holds a small proportion of nitrogen. It also possesses about 2·0 per cent of carbonate of lime. All these, though small in amount, should improve the soil. Other elements of plant food are present in practically negligible quantities.

It must not be expected that a deposit of this character can take the place of manure in the up-keep of fertility, nor can it be regarded as allied to fertilizer materials which furnish notable amounts of available nitrogen, phosphoric acid, and potash. It is rather an amendment, which, from its general character, may be expected to be of more service to sandy loams than to clays. Trial only will show its value, as much will depend upon its influence on the texture of the land to which it is applied. We could not advise going to any great expense in obtaining this "mud" before ascertaining, on a small scale, its effect; and we think it would be advisable to expose the deposit to the air for some weeks before working it into the soil, for, as dug, it appears to be somewhat sour, in spite of its small content of carbonate of lime. This exposure would also correct the injurious effects of any sulphur compounds that are likely to be present.

"MUD" FROM MIRA RIVER, CAPE BRETON, NOVA SCOTIA.

Laboratory No. 16993.—This sample was taken from the bed of the Mira river in Cape Breton, 10 miles from salt water. "The deposit is about 10 feet thick. If of any fertilizing value, large quantities could be readily and cheaply obtained by the farmers in the neighbourhood. The analysis and report as to its use and value may mean a great deal to the people of the Mira river."

This "mud" upon exposure dries to a dark-grey mass, which can be readily broken, forming small, irregular fragments, the fractured surfaces indicating a fair amount of vegetable matter. Microscopical examination shows that the basis of this mud is largely fine sand and silt; there is apparently very little clay present.

The dried and prepared sample was submitted to analysis, and the following results obtained:—

Analysis—	
Moisture	4.25
Organic and volatile matter [1]	28·70
Mineral matter insoluble in acid	58.80
Oxide of iron and alumina	7.59
Lime	.84
Potash	.25
Phosphoric acid	.19
	100.62

[1] Containing nitrogen .751

In its essential features, both physically and chemically, this "mud" resembles many samples of river deposits from the Maritime Provinces that have been analysed in the Farm laboratories. It cannot be regarded as in the same class with commercial fertilizers, for its percentages of the essential elements of plant food are not large; but there can be no doubt of its value for the improvement of poor soils, and more particularly those deficient in nitrogen and organic matter. Its chief constituent of fertilizing value is nitrogen, which is associated with the organic matter present.

This nitrogen would slowly become converted in the soil into forms available for crop growth, and thus lead to increased production. The percentages of lime, potash and phosphoric acid are not larger than those found in ordinary good soils, but we may well conclude, from experimental work done on similar materials a few years ago, that these elements exist in a condition of comparatively high availability, though not so available as in the forms found in commercial fertilizers.

The physical condition of the mud would be, we believe, an important factor in its possible effect on soils, and we should expect the best results to be obtained from its applications to fairly heavy loams. To sum up, this material is not a fertilizer, strictly so-called, but may be considered as an amendment, chiefly of value for soils deficient in organic (vegetable) matter, and which are, in consequence, poor in nitrogen. It cannot be depended upon exclusively for the up-keep of the fertility, but could no doubt be profitably used in the building up of poor soils, if cheaply obtained. Its most notable feature, compared with other river muds that have been examined, is its comparatively high nitrogen content, and it is this fact that gives it its chief value from the fertilizer point of view.

MUCKS AND PEATS.

We are constantly receiving samples of black muck, peat, and similar materials for examination and report, either as to fertilizing value, if used as a manure, or the possibility of successful reclamation for cropping of the area covered by the deposit. In former years these, for the most part, have been analysed, the data appearing, with deductions, in the annual report of this Division. During the past year the time at our disposal has not permitted a quantitative analysis of the samples sent in, but as far as possible they have been examined qualitatively and reported on to the senders. In spite of our best endeavours, however, in this matter, there still remain a considerable number of samples of this character awaiting our attention.

FODDERS AND FEEDING STUFFS.

This chapter includes the analyses of a number of "feeds" used in feeding experiments with dairy cows, sheep and swine conducted by the Division of Animal Husbandary at the Central Experimental Farm, Ottawa. It also contains the analyses of forage crops used in feeding trials at certain of the Branch Farms and Stations.

Further, the composition, as ascertained in the Farm laboratories, is given of a number of feeds of a more or less miscellaneous character, sent in during the year for information as to their nutritive value.

In these days of high prices of nearly all classes of mill feeds and milling products, it is important for true economy that the farmer should be able to compare the feeds offered, not only as to price per ton but also as to composition, more particularly as to protein and fat content. The data and information here given therefore should prove of considerable interest to dairymen, stock raisers and indeed to all farmers. This subject is one that merits closer attention than it has received in the past.

GROUND OATS.

Laboratory Nos. 19651 and 20421.—These oats were ground and fed on the Central Farm, Ottawa, in 1914. From experiments made in 1908 we found that, in mature,

well-ripened oats, the proportion of kernel to hull was considerably higher than in oats caught by the frost while still immature. This fact naturally makes the immature "light weight" oats the poorer feed, compared weight for weight with plump, mature oats.

Sample No 19651, while not ranking with the best quality oats, approaches closely the average obtained from the analysis of a number of good grade oats. Sample No. 20421 is evidently from oats of the first quality, and is exceptionally high in protein and fat.

Analysis of Oats.

Constituent.	No. 19651.	No. 20421.	Banner Oats, best quality	Average from many sources.
	Per cent.	Per cent.	Per cent.	Per cent.
Water	8·44	10·95	12·74	10·4
Protein	10·35	13·53	11·22	11·4
Fat	4·73	6·11	4·82	4·8
Carbohydrates	61·65	56·08	58·84	59·4
Fibre	11·23	10·32	9·47	10·8
Ash	3·60	3·01	2·91	3·2
	100·00	100·00	100·00	100·00

It may be of interest to note that, on an average, oats contain somewhat less protein and are decidedly richer in fat than wheat; compared with corn they are much richer in protein, with an almost equal percentage of fat.

Though oats occupy the first place among the cereals in stock feeding, barley is recognized by those who have had experience with it, as closely following; especially are its merits valued in pork production and as a constituent in the ration of the dairy cow. The practice, now becoming common, of sowing barley and oats together for grain for feeding is one that not only gives excellent yields but also furnishes, in the mixed ground grain, a meal palatable and nutritious, and one eminently suitable for many classes of stock.

OAT FEED.

Laboratory No. 20199.—This feed was forwarded by a correspondent in Sawyerville, Que., and stated to be an output of the Quaker Oat Company, the results of grinding the small and light oats that are rejected in the manufacture of oatmeal. The local selling price was $23 per ton. Our correspondent asks how it would compare with bran at $29 per ton for milch cows.

Analysis—	Per Cent.
Moisture	3.20
Protein	7.70
Fat	2.77
Carbohydrates	58.63
Fibre	23.86
Ash	3.84
	100.00

The sample showed a large proportion of hulls and a small amount of fine meal. Its appearance would lead to the conclusion that it was a fibrous feed of low protein value, and the analysis confirms this opinion. It is a very poor feed, both in composition and digestibility, and certainly bran at $29 per ton would be much better value. This feed, in our opinion, is not worth $10 per ton. Bran contains on an average 15 per cent protein and 4·0 per cent fat, with not more than 9·0 per cent of fibre.

Laboratory No. 20553.—Sent by a correspondent in Simard, Que., where it sold locally as an "oat feed" without any guarantee. There is no information as to brand or manufacturer. As received it is a finely-ground meal.

Analysis—	Per Cent.
Water	4.80
Protein	6.48
Fat	2.47
Carbohydrates	52.62
Fibre	27.75
Ash	5.88
	100.00

This material is of extremely low feeding value, the analysis indicating that it consists esentially of oat hulls, the presence of which is masked by the fine condition to which the meal has been ground.

The practically worthless character of feeds of this class makes it extremely doubtful if they can be economically used at any price.

GROUND BARLEY.

Laboratory No. 18699.—This sample was taken from stock used in pig feeding experiments at the Experimental Farm, Agassiz, B.C. For the purpose of comparison we append the averages from the analyses of a series of Canadian and American-grown barleys.

Analysis of Barley.

Constituent.	No. 18699	Average of Canadian-grown barleys.	Average of American-grown barleys.
	Per cent.	Per cent.	Per cent.
Analysis—			
Water	10·53	11·96	10·8
Protein	11·98	10·57	11·0
Fat	2·14	2·06	2·1
Carbohydrates	67·88	68·90	69·1
Fibre	5·19	4·10	4·2
Ash	2·28	2·41	2·5
	100·00	100·00	100·00

Compared with oats, from the standpoint of composition, the protein content of the two cereals, generally speaking, is very similar, though certain barleys grown specially for malting purposes possess less protein and more starch than oats. For feeding purposes, a barley rich in protein is, of course, to be desired. The fat content of barley is about one-half that of oats; in fibre, oats contain about twice as much as barley.

BRAN.

Laboratory No. 18216.—From stock obtained from the Ontario and Manitoba Milling Company, Ltd.

Laboratory No. 18226.—Taken from stock purchased from the Maple Leaf Milling Company, Ltd.

Laboratory No. 20422.—From stock purchased from the Ogilvie Milling Company, Ltd.

All three brands were used in experimental cattle feeding work at the Central Farm, Ottawa.

ANALYSIS of Bran.

Constituent.	No. 18216.	No. 18226.	No. 20422.
	Per cent.	Per cent.	Per cent.
Water	8·70	9·15	12·38
Protein	16·43	16·75	17·50
Fat	3·33	3·21	4·23
Carbohydrates	55·20	57·36	50·96
Fibre	8·58	7·64	9·47
Ash	7·76	5·89	5·46
	100·00	100·00	100·00

Our analyses of genuine Canadian brans made in 1903, on samples supplied by the larger milling companies in the Dominion, gave the following average data: protein, 14·52 per cent; fat, 4·37 per cent; fibre, 10·14 per cent. To meet the requirements of the Feeding Stuffs Act, a bran must contain not less than 14·0 per cent of protein, not less than 3 per cent fat, and not more than 10·0 per cent of fibre.

SHORTS.

Laboratory No. 19654.—This sample was taken from stock manufactured by the Canadian Cereal and Flour Company, Ltd., Toronto, and used in feeding experiments conducted by the Division of Animal Husbandry at the Central Farm, Ottawa. The price was $25 per ton.

Analysis—	Per Cent.
Water	8.23
Protein	17.19
Fat	6.02
Carbohydrates	55.31
Fibre	8.87
Ash	4.38
	100.00

Laboratory No. 18227.—From stock purchased from the Maple Leaf Milling Company, Ottawa.

Analysis—	Per Cent.
Water	9.51
Protein	15.04
Fat	4.32
Carbohydrates	60.09
Fibre	6.34
Ash	4.70
	100.00

Laboratory No. 18700.—This sample, forwarded from the Experimental Farm at Agassiz, B.C., was designated "Robin Hood" brand.

Analysis—	Per Cent.
Water	9.26
Protein	18.06
Fat	4.64
Carbohydrates	58.09
Fibre	6.18
Ash	3.77
	100.00

The Commercial Feeding Stuffs Act requires that feeds sold as shorts or middlings should contain not less than 15·0 per cent protein and 4·0 per cent fat, and not more than 8·0 per cent fibre. In 1909 we analysed a number of genuine shorts and obtained the following averages: protein, 15·93 per cent; fat, 5·24 per cent; and fibre, 5·23 per cent.

The shorts of to-day are practically a species of fine bran, differing markedly from the floury, mealy shorts of the old stone mills. Shorts, as we knew them before the introduction of the roller process of milling, are almost a feed of the past. This is to be regretted from the standpoint of the farmer who depended on the mealy shorts, in conjunction with skim-milk, for pig and calf feeding. For this purpose they were highly esteemed. The present-day shorts, though not as desirable for pigs and young stock, are, however, richer in protein and mineral matter, and consequently more valuable for milk production, muscle making and the development of the frame.

GROUND CORN.

Laboratory No. 19653.—This was purchased from a local miller and used in certain pig feeding experiments carried on during the summer and fall of 1914 at Ottawa. The price was $30.40 per ton.

Analysis—	Per Cent.
Water	11·59
Protein	9·40
Fat	5·01
Carbohydrates	70·96
Fibre	1·44
Ash	1·60
	100.00

This sample conforms to the standard for a meal from the entire grain; the analysis denotes a corn meal of excellent quality. As is generally recognized by stockmen, corn meal is very palatable and is much relished by farm animals in general. It is essentially a fattening food.

Laboratory No. 20424.—This is a corn meal ground at the Central Farm, Ottawa, from the variety known as Yellow Dent, which was purchased at 70 cents per bushel. It is one of the feeding stuffs used in experimental work by the Animal Husbandry Division.

Analysis—	Per Cent
Water	12·67
Protein	9·06
Fat	5·89
Carbohydrates	69·19
Fibre	1·64
Ash	1·55
	100.00

These data indicate a quality practically identical with that of No. 19653, just discussed.

GLUTEN FEED.

Gluten Feed is a by-product in the manufacture of starch and glucose from corn. It consists practically of all the parts of the corn kernel save the starch and the germ, the essential constituents being gluten meal—a highly nitrogenous product now seldom found on the market—and corn bran. It is a valuable concentrate, rich in protein and with a fair oil or fat content, and its somewhat loose mechanical condition no doubt aids in its digestion by the animal. It is much relished by stock, and is highly

esteemed by dairymen as one of the sources for increasing the protein in the ration of dairy cows.

Laboratory No. 18214.—Canada Starch Co., Cardinal, Ont.

Laboratory Nos. 19293-4.—Forwarded from Lennoxville, Que., brand and manufacturer not stated.

Laboratory No. 19351.—Canada Strach Co., Cardinal, Ont.

Laboratory No. 20418.—Canada Starch Co., Cardinal, Ont.

Samples Nos. 18214, 19351, and 20418 were taken from stock used in feeding experiments conducted by the Division of Animal Husbandry at the Central Farm, Ottawa.

The average composition of gluten feed, as obtained from American sources, is added for the purposes of comparison.

ANALYSIS of Gluten Feed.

Constituent.	No. 18214.	No. 19293.	No. 19294.	No. 19351.	No. 20418.	Average from American sources.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Water	6·41	5·96	5·65	7·70	9·25	9·2
Protein	25·54	26·44	29·74	26·79	24·12	25·0
Fat	1·90	2·43	2·02	2·84	5·23	3·5
Carbohydrates	58·[illegible]9	56·74	56·04	55·08	53·21	53·5
Fibre	6·74	7·56	4·59	6·39	7·38	6·8
Ash	·82	·82	1·96	·80	·81	2·0
	100·00	100·00	100·00	100·00	100·00	100·00

The Canadian product, it will be observed, compares very well with that of American factories in nutritive qualities; the differences tend to show that our gluten meal is a little richer in protein and somewhat poorer in oil. With the exception of No. 18214, which is low in oil, No. 19294, which is exceptionally high in protein, and No. 20418, which contains a percentage of oil somewhat above the average, the samples indicate a very fair uniformity in composition.

SUPERIOR CORN FEED.

Laboratory Nos. 18228 and 20423.—This is a by-product in the manufacture from the corn breakfast food known as White Hominy.

It was purchased from H. D. Marshall, Ottawa and cost $29.50 per ton.

ANALYSIS of Superior Corn Feed.

Constituent.	No. 18228.	No 20423.
	Per cent.	Per cent.
Water	6·98	9·84
Protein	11·16	11·53
Fat	6·61	8·66
Carbohydrates	69·57	63·02
Fibre	3·09	4·42
Ash	2·59	2.53
	100·00	100·00

The guarantee calls for protein 10·49 per cent and fat 8·18 per cent; our analyses show that the material supplied satisfactorily meets the requirements. In protein and fat content, this meal closely resembles corn bran, but in its fibre it is much lower—and this feature should make it the more nutritious and more desirable feed.

OIL CAKE MEAL.

Laboratory No. 19652.—This sample was from stock manufactured by Sherwin-Williams, Ltd., used in pig feeding experiments at Ottawa. The price was $37 per ton.

Analysis—

	Per Cent.
Water	8·28
Protein	34·95
Fat	7·71
Carbohydrates	36·44
Fibre	7·85
Ash	4·77
	100·00

This analysis agrees very well with that of the meal obtained by the "old process," in which the linseed oil is extracted by pressure. By the "new process," in which the oil is extracted by fat solvents such as naphtha, a meal is obtained that is characterized by a somewhat higher percentage of protein (approximately 38 per cent) and a decidedly lower percentage (from 2·5 per cent to 3·0 per cent) of oil. It is generally considered that the old process meal is the better of the two, partly by reason of its higher oil content and partly perhaps because its protein is somewhat more digestible. It would seem that in oil cake meal we have a feeding stuff in which the oil or fat is worth more than protein, weight per weight.

NUTTED OIL CAKE MEAL.

Laboratory No. 20419.—This product is apparently ground linseed oil cake, and was purchased from Sherwin-Williams Company, Ltd. It cost $36 per ton It is in the form of a very fine meal and from its appearance and condition it would be judged a wholesome, palatable feed of high quality. The sample was taken from stock used in feeding experiments with dairy cows by the Animal Husbandry Division.

Analysis—

	Per Cent.
Water	9·18
Protein	36·50
Fat	8·67
Carbohydrates	33·28
Fibre	7·45
Ash	4·92
	100·00

In both protein and oil this sample is decidedly superior to No. 19652, previously reported.

FORT WILLIAM OIL CAKE MEAL.

Laboratory No. 19292.—This feeding stuff, labelled as above, is not oil cake meal as generally recognized. It contains no linseed, and appears to consist largely of a corn by-product. The sample submitted to analysis was forwarded from Lennoxville, Que., where it was offered for sale, but with no particulars as to manufacture or composition.

Analysis—	Per Cent.
Water	4.95
Protein	16.18
Fat	9.52
Carbohydrates	59.17
Fibre	9.09
Ash	1.09
	100.00

It could not be learned if this product was sold under guarantee as to protein, fat, and fibre, as the law requires, but of this there can be no doubt—that the brand or name under which it was sold is misleading. Compared with true oil cake meal, which contains about 35 per cent protein, it is an inferior feed. Judged on its own merits, it would appear to be an acceptable material, with a protein content equal to that in good quality bran; indeed in composition, save for a higher percentage of fat, it much resembles that feed.

FLAX PRODUCTS.

Three samples of flax products obtained in the threshing of flax seed were forwarded from the Canadian Flax Mills, Limited, St. Catharines, Ont., with a request for a report on their feeding value.

Laboratory No. 20140.—Was prepared by grinding together the seed and bolls. "This meal contains all the seed and all the bolls obtained in the threshing operation."

Laboratory No. 20141 consists of the broken bolls or capsules of the flax seed, sometimes known as flax chaff. The sample contains a small proportion of small and shrivelled flax seed, and a few fragments of flax stems or straw.

Laboratory No. 20142 is flax shives or fragments of broken flax straw.

ANALYSIS of Flax Products.

Constituent.	No. 20140.	No. 20141.	No. 20142.
	Per cent.	Per cent.	Per cent.
Water	5·62	5·81	6·25
Protein	31·50	16·34	3·65
Fat	19·39	16·26	1·32
Carbohydrates	18·66	28·67	26·31
Fibre	20·19	28·90	60·85
Ash	4·64	4·02	1·62
	100·00	100·00	100·00

We do not know of any experimental or other work in the feeding of a meal produced by the grinding together of the flax seed and bolls, but the present analysis (No. 20140) would indicate a material with notable amounts of protein and fat. These in themselves would make the feed one of high feeding value, but unfortunately they are associated with a very considerable amount of fibre, an undesirable component, when in excessive quantities, in concentrated feed stuffs. To what extent this fibre might affect the digestibility of the protein and fat we cannot say, but the data obtained on the present sample would indicate that this material is worthy of trial.

The sample of flax bolls (No. 20141) would appear to contain a considerable proportion of flax seed, which undoubtedly is the source of the comparatively high protein and fat percentages found in this product. The percentage of fibre is higher than in the material discussed in the preceding paragraph, amounting to nearly 30 per cent,

and this fact makes it difficult to pronounce upon the feeding value of this product. We are of the opinion that the high fibre content would materially depress its nutritive qualities. Feeding experiments would be necessary to establish its worth.

The analysis of the sample of flax shives (No. 20142) indicates a very poor feed—one very low in protein and fat, with an excessive amount of fibre. Furthermore, it would be unpalatable and possibly injurious by reason of its coarse, harsh, and brittle nature. It could not be used, in our opinion, for feeding purposes.

SOJA BEAN CAKE.

Soja or Soy bean cake is a palatable product especially rich in protein and therefore of high feeding value. Judiciously used in the ration, it may, if price is favourable, be fed to advantage in the place of cottonseed cake or linseed cake, for milk production. Experiments conducted in England, Germany, and the United States all go to show that this material is a concentrate of very considerable worth, especially for dairy cattle, and that no harmful results follow its use when fed in amounts not exceeding 5 pounds per day.

Laboratory No. 17729.—This sample, labelled Soja bean cake was forwarded from New Westminster, B.C., with the statement that it was imported by Messrs. Kasai & Co., a Japanese firm with head office at Osaka, Japan. It comes in cakes weighing about 60 pounds each, and the price is $35 per ton f.o.b. Vancouver wharf.

Analysis—

	Per Cent.
Moisture	8.04
Protein	38.76
Fat	7.95
Carbohydrates	35.45
Fibre	3.21
Ash	6.59
	100.00

From these results we conclude that it would prove a valuable feeding stuff. It is very rich in protein and contains a notable percentage of oil or fat, with a low fibre content; in these features it ranks well with the best concentrates. Provided that it is found palatable, and no fear is expressed on that score, it could be used to advantage in the meal ration.

COTTON SEED MEAL.

A number of samples of this well-known concentrate have been analysed during the year, the data obtained being as follows:—

ANALYSIS of Cotton Seed Meal.

Constituent.	No. 18218.	No. 20126.	No. 20426.	No. 20550.	No. 20551.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Water	5·78	....	8·33	5·58	6·05
Protein	43·52	42·87	43·50	43·95	43·20
Fat	7·08	10·78	8·23	6·60	8·89
Carbohydrates	29·61	....	23·75	27·99	25·91
Fibre	6·93	....	9·65	9·65	8·79
Ash	7·03	....	6·54	6·32	7·26
	100·00		100·00	100·00	100·00

Laboratory Nos. 18218 and 20426 are from stocks used in cattle feeding experiments at the Central Farm, Ottawa. The brand is "Michigan Farmers' Brand" sold by J. E. Bartlett and Co., Jackson, Mich., U.S.A., and the guarantee of which is as follows:—

	Per cent.
Protein	41 to 46
Oil	7 to 12
Crude fibre	6 to 10
Carbohydrates	20 to 30

The price was $34.50 per ton.

The meal supplied meets the guarantee and is to be regarded as of excellent quality.

Laboratory No. 20126 is the "Pioneer Cotton Seed Meal," sold by J. E. Soper Co., Boston, Mass., and guaranteed to contain: Protein, not less than 41 per cent; fat or oil, not less than 7 per cent.

Our analysis shows that the guarantee has been complied with and that it is a cotton seed meal of high grade.

Laboratory Nos. 20550-1 were forwarded for examination without any information as to brand or guarantee. The analyses indicate meals of practically equal feeding value of very good quality.

Genuine cotton seed meals are of a bright yellow colour, while inferior grades are much darker, and show, on close inspection, fragments of hull intermixed with the fine meal. Since very considerable variation in composition is found in cotton seed meals on the market, the importance of purchasing this feeding stuff on guaranteed analysis will be obvious.

PEANUT OIL MEAL.

Laboratory No. 20634.—Peanut cake is a by-product in the manufacture of oil from the peanut. The meal is prepared by grinding the cake, or is ground peanut after the extraction of the oil by solvents. The sample analysed is from the stock used in cattle feeding experiments conducted by the Animal Husbandry Division at Ottawa. It was manufactured by the Oil Seeds Company, Bayonne, N.J., and cost in Canada approximately $40 per ton.

ANALYSIS of Peanut Oil Meal.

Constituent.	No. 20634.	Average from American sources.
Water	4·45	10·7
Protein	42·89	47·6
Fat	6·49	8·0
Carbohydrates	32·89	23·7
Fibre	4·30	5·1
Ash	8·98	4·9
	100·00	100·00

This product, though well known in the United States and European countries, has not yet been widely used in Canada. From its high protein content, which gives it a place among the richest concentrates on the market, and its palatability, it is undoubtedly a valuable feeding stuff, especially for cattle. Economy in its employment would, however, be determined by its price as compared with other concentrates on the market. It is sold under a guarantee of not less than 40 per cent protein, not less than 7 per cent fat, and not more than 7 per cent fibre.

RICE MEAL AND RICE POLISHINGS.

Laboratory Nos. 17317, 18701 and 17352.—These rice products were forwarded from the Experimental Farm, Agassiz, B.C., where they were being used in feeding tests with swine and poultry. The meal was obtained from the Imperial Rice Milling Co., Vancouver, B.C., and the polishings were purchased from the Grain Growers' Agency at New Westminster, B.C. Rice meal, No. 18701, bears no brand or distinguishing mark.

ANALYSIS of Rice Meal and Rice Polishings.

Constituent.	Rice Meal.		Rice Polishings
	No. 17317.	No. 18701.	No. 17352.
	Per cent.	Per cent.	Per cent.
Moisture	9·88	10·62	11·85
Protein	12·96	11·70	12·16
Fat	14·89	9·02	9·02
Carbohydrates	52·23	59·39	56·35
Fibre	3·01	3·14	3·36
Ash	7·03	6·13	7·26
	100·00	100·00	100·00

Rice meal, when genuine, is generally considered a very nutritious and wholesome feed, rich in digestible protein and fat. Sample No. 17317 has afforded data for protein and fat slightly above the average, and is further characterized by a somewhat lower fibre content than is usually found in this product.

Rice polishings is "composed of the floury particles which result from polishing the kernels to produce a pearly lustre." Comparing these data with those from American sources, this sample appears to be of a somewhat inferior quality. It will be observed to differ but very little from the rice meal samples here discussed.

Rice meal in a mixed grain ration and fed with skim-milk is reported from several of the United States Experiment Stations as giving good returns in pig feeding. It is considered by some experimenters as equal to corn meal when used judiciously. Rice polishings have also been employed in pig feeding, with somewhat poorer results.

SWIFT'S DIGESTER TANKAGE.

Laboratory No. 19650.—Tankage, a by-product of the packing house, is usually characterized by a very high percentage of protein and a considerable fat content. It frequently contains a notable amount of earthy phosphates from the presence of bone. It has found its chief use in feeding pigs and poultry, but can also be employed in limited quantities in cattle and sheep feeding. Owing to its highly nitrogenous character it must be used with discretion in the ration. There are many inferior brands on the market, containing hair, hoof, and other material worthless from the feeding standpoint. Particular care should be taken in purchasing tankage and meat meals to see that they are perfectly sound and free from foreign matter of a worthless or harmful character.

Analysis—	Per Cent.
Water	13.15
Protein	59.35
Fat	9.55
Carbohydrates	.33
Fibre	2.69
Ash	14.93
	100.00

From its condition and composition as revealed by analysis, this sample ranks with brands of the best quality.

HARAB TANKAGE.

Laboratory No. 18225.—From the Harris Abattoir Ltd., Toronto.

Analysis—	Per Cent.
Water	6·85
Protein	62·89
Fat	7·60
Carbohydrates	3·38
Fibre	2·42
Ash	16·86
	100·00

This differs mainly from No. 19650 in a somewhat higher percentage of protein and about 2 per cent less fat. It is representative of a first-class grade of tankage.

FISH SCRAP.

As in the case of meat wastes, so fish wastes—and frequently the entire fish—are prepared for use in stock feeding. From fish oil and glue factories many products more or less rich in protein are put upon the market. Some of these are of low grade and valuable only as fertilizers, being unsuitable by condition or composition for stock. On the other hand, there are certain brands of refined and carefully selected material, sound and sweet, that may be safely and legitimately employed as one of the sources of protein in the ration. The classes of stock for which these "scraps" are more particularly used are pigs and poultry. Many of the brands specially prepared for the latter possess very considerable amounts of bone phosphate, a constituent generally held to be useful in egg production.

Laboratory Nos. 16132-3.—These samples of "fish scrap" were submitted by the Ottawa Poultry Association with a request for a report upon their usefulness in poultry feeding. They are the product of the International Glue Co., Boston, Mass., and are labelled Blue Ribbon Fish Scrap, "coarse" (No. 16132) and "fine" (No. 16133).

ANALYSIS of Fish Scrap.

Constituent.	No. 16132.	No. 16133.
	Per cent.	Per cent.
Moisture	6·23	5·44
Organic matter	67·75	57·66
Mineral matter insoluble in acid	25·62	36·39
Mineral matter soluble in acid	·40	·51
	100·00	100·00
Phosphoric acid	10·71	14·72
equivalent to bone phosphate	23·46	32·34
Nitrogen	9·24	8·04
equivalent to protein	57·76	50·25
Fat	2·28	2·63

The essential differences between these two brands, apart from mechanical condition, lie in their percentages of protein and phosphate of lime. The "coarse" is the richer in protein and the poorer in bone phosphate. The percentages of fat are practically identical, and very low, which seems to the writer a feature generally desirable in scraps for poultry feeding.

Laboratory No. 11268.—Dogfish scrap from the Dogfish Reduction Works, Canso, N.S. This is sold for fertilizing purposes only, but the present analysis was made at the request of the Ottawa Poultry Association, with a view of determining its suitability for use in poultry feeding.

Analysis—	Per Cent.
Moisture	8.44
Organic matter	83.40
Mineral matter, soluble in acid	7.69
" insoluble in acid	.47
	100.00
Phosphoric acid	2.88
equivalent to bone phosphate	6.28
Nitrogen	8.89
equivalent to protein	55.56
Fat or oil	24.72

Though comparatively rich in protein it is low in phosphates. Its use in poultry feeding is undesirable and probably unsafe by reason of its high oil content.

ALFALFA MEAL.

Laboratory No. 18703.—This is simply ground alfalfa hay. It is a product used in certain of the western United States, but so far has not been largely fed in Canada. The sample analysed is from stock used in feeding experiments at Agassiz, B.C.

Analysis—	Per Cent.
Water	9.42
Protein	14.08
Fat	2.22
Carbohydrates	39.99
Fibre	24.08
Ash	10.21
	100.00

Since the percentage of crude protein in the material approaches closely that of bran, it has been stated that these two feeds have practically the same nutritive value. This, however, is not the case; the alfalfa meal is much the inferior, for a large proportion of its crude protein is in the non-albuminoid form, ranking in nutritive properties not higher than the carbohydrates. In bran the protein is practically all in the form of the more valuable true albuminoids, the sole nutrient furnishing the supply of organic nitrogen necessary for the wants of the body.

FEEDING MOLASSES.

Laboratory No. 20425.—This is cane molasses from Louisiana, Mo., U.S.A., and is commonly known as blackstrap. It is a palatable and appetizing material, and in addition to its nutritive value, which is entirely dependent on its sugar content, is considered, when fed in moderation, to increase the digestibility of the other feeds used in the ration and to assist in keeping the animal in a healthy condition. In general feeding, and viewed simply as a furnisher of nutrients useful in the animal economy, molasses must be regarded as a sugar feed, supplying practically no protein or fat. Unlike beet-root molasses, the molasses from the sugar cane is not characterized by any bitter taste and, further, is comparatively free from those salts which give the former its excessive laxative properties when too liberally used. Molasses and molasses feeds have found their use more particularly in preparing animals for the ring, but in moderate quantities in a well-balanced ration they can be employed, if their prices are not excessive, in the daily feeding. The price of the molasses analysed was $23 per ton at Ottawa, which from the nutritive standpoint makes it a much cheaper form in which to use this material than most of the molasses feeds on the market.

Analysis—	Per Cent.
Water	28.12
Protein	4.69
Fat	....
Fibre	....
Carbohydrates (essentially sugars)	61.41
Ash	5.78
	100.00

MOLASSINE MEAL.

Laboratory No. 18217.—This is a manufactured product imported from England. The molasses it contains is apparently held by sphagnum moss, which is found to be an excellent absorbent for the purpose of presenting, in an acceptable and convenient form for feeding, a material (molasses) which by itself is more or less troublesome and disagreeable to use. The absorbent, moss, contributes nothing of feeding value, but counteracts, in a degree, the laxative effect on the system experienced when feeding molasses alone.

Molasses feeds, in general, are essentially sugar feeds. They are appetizing and thus useful in connection with the employment of certain more or less unpalatable roughages. They are to be valued simply by their sugar content, and sugar is an easily digested and assimilated nutrient of very considerable feeding value as an energy, heat, and fat producer. Feeds of this character furnish practically no protein and fat, the nutrients which the farmer specially looks for in the concentrates which he purchases to balance the ration made up essentially of home-grown feeds and fodders, and which are usually characterized by an excess of carbohydrates (non-nitrogenous nutrients). Molasses and molasses feeds as a class are stated to be useful, when used judiciously, in keeping the animal in a healthy and vigorous condition, to aid in the digestion of the ration and to act mildly in a medicinal way, by preventing constipation.

The sample analysed was from stock used in feeding trials by the Division of Animal Husbandry at the Central Farm, Ottawa, and cost $37 per ton.

Analysis—	Per Cent.
Water	19.16
Crude protein	7.61
Fat	.26
Carbohydrates (chiefly sugars)	59.36
Fibre	6.16
Ash	7.45
	100.00

As we have frequently pointed out, the market price of molasses feeds in general is considerably higher than appears to be warranted by their direct feeding value as revealed by analysis. That they may be legitimately and profitably used as "conditioners" there can be little doubt, but as feeds for economically supplying carbohydrates in the every-day ration, at present prices, their employment is open to question.

MOLASCUIT.

Laboratory No. 18213.—This product, imported from Demarara, British Guiana, is manufactured from cane molasses and the cells from the interior of the exhausted sugar cane, used as an absorbent to hold the molasses.

Analysis—	Per Cent.
Water	13.57
Protein	3.43
Fat	.39
Carbohydrates (chiefly sugars)	63.38
Fibre	8.83
Ash	10.40
	100.00

These data are in fair accord with the guarantee, and indicate a "sugar feed" of excellent quality. As with others of its class, it adds nothing to the ration in protein or fat. Its economic use, as we have pointed out in discussing feeds of this character, would be largely governed by its price. At the rates hitherto prevailing it is difficult to understand how many of the feeds of this character can be profitably employed in any quantities as a regular constituent of the ration.

CALDWELL'S MOLASSES MEAL.

Laboratory No. 20420.—This is manufactured by the Caldwell Feed Co., Ltd., of Dundas, Ont., and stated to be composed of 80 per cent to 84 per cent cane molasses and sphagnum moss. The latter is employed simply as an absorbent and to present the molasses in a convenient form for feeding, though it is held that the moss prevents any undue laxative effect following the use of molasses in large quantities.

Analysis—	Per Cent.
Water	21·12
Protein	5·10
Fat	·90
Carbohydrates (chiefly sugars)	59·90
Fibre	6·64
Ash	6·34
	100·00

This material compares very favourably as regards sugar content with the larger number of feeds of a similar nature upon the market, which, as we have already pointed out, are simply to be regarded as supplying readily digestible carbohydrates.

CALF MEAL.

Laboratory No. 20383.—Calf meals are preparations used as substitutes or partial substitutes for new milk in the feeding of young calves. The components of these feeds are many, including linseed meal, bean meal, shorts, low grade flour, oatmeal, corn meal, etc., Sugar or sugar products also are sometimes added to increase the proportion of readily assimilated carbohydrates, and small quantities of certain aromatic compounds for rendering the meal pleasant and palatable. From the large number of materials employed, and the varied proportions in which they are used, the composition and hence the nutritive value of any particular brand is a matter that must be specially determined. Few classes of feeds contain members differing so widely among themselves in nutritive value as that generally advertised as "calf meals."

The sample here reported was sent from Spencerville, Ont., the output of a local firm. Its components are stated as flaxmeal, buckwheat, shorts, cotton seed meal, low grade flour, and oatmeal.

Analysis—	Per Cent.
Water	8·94
Protein	24·44
Fat	13·85
Carbohydrates	44·91
Fibre	3·73
Ash	4·13
	100·00

In both protein and fat this meal must be considered as possessing high values, and the low fibre content would undoubtedly enhance its nutritive qualities for young stock. The presence of cottonseed meal, however, is most undesirable, for though this feed is rich in protein and fat, and can be used to advantage for adult animals of many classes, it is peculiarly unsuited to young stock, acting, if fed continuously or in large amounts, as if it were poisonous, and frequently proving fatal.

FEED FLOUR.

Low grade flours, known as red-dog, dark feeding flour, etc., may frequently be advantageously used in the ration, especially for young stock (calves and pigs) and for milch cows. They usually contain the germ of the wheat kernel, which is rich in oil, and are characterized by a high protein content, due to the presence of a considerable portion of those glutinous parts of the grain that formerly found a sale in "shorts" or "middlings."

Laboratory Nos. 20917 and 20918.—These samples were stated to be the product of the Maple Leaf Milling Co., Toronto, and are feed flours branded as "Ideal."

ANALYSIS of Feed Flour.

Constituent.	No. 20197.	No. 20198.
	Per cent.	Per cent.
Moisture	6·35	6·22
Protein	21·68	21·56
Fat	2·41	4·04
Carbohydrates	62·93	62·22
Fibre	3·69	2·96
Ash	2·94	3·00
	100·00	100·00

The average composition of red dog flour, as given by an American authority, is 18·4 per cent protein, 4·0 per fat, and 3·0 per cent fibre. These samples therefore are somewhat above the average in protein content and must be considered of good quality, though one of them (No. 20197) is a little low in fat. The percentages of fibre and ash indicate freedom from refuse and dirt.

KAFFIR CORN.

This grain, though well known and of some importance in certain semi-arid regions of the southwestern United States, has not been used much in Canada. The seed is much smaller than that of Indian corn, and is generally held to be less palatable and probably less nutritious than that grain. It is slightly astringent in effect and, in consequence, is found useful for feeding with laxative forage crops, such as clover and alfalfa.

Laboratory Nos. 20332 and 20333.—These two samples labelled Kaffir corn or Korean millet from stock imported from Japan were received from the Department of Agriculture, Victoria, B.C., with a request for their analysis. They were being used in that province for poultry feeding, largely as a substitute for Indian corn.

Before preparation for analysis, these samples, between which no difference could be detected, were forwarded to the Seed Commissioner, Department of Agriculture, Ottawa, for identification, from whose office we subsequently received the following report:—

> "The two samples of seed referred to in your letter of 8th inst., belong to some variety of *Andropagon sorghum,* Brot. The cultivated forms of this plant are divided into three groups:—
>
> "(1) Those varieties whose juice has a high per cent of sugar which is used for making syrup and from which sugar is sometimes produced, known as sorghum (not cane sugar).

"(2) Those varieties cultivated for their grain known as Kaffir corn, African millet, Indian millet, durra milo maize, Jerusalem corn, Guiana corn, and Egyptian rice corn.

"(3) Those varieties cultivated for their spikes, which are used for making brooms known as broom corns.

"The seeds forwarded by you probably belong to some variety of the second group."

Our analysis of the mixed samples afforded the following data:—

Analysis—	Per Cent.
Moisture	9.01
Protein	11.37
Fat	4.95
Carbohydrates	71.78
Fibre	1.00
Ash	1.89
	100.00

Weight of 1,000 kernels, 9.942 grams.

This analysis differs somewhat from that quoted by certain textbooks for Kaffir corn, in containing less fibre and in being richer in fat.

The chief poultry instructor of British Columbia does not consider it as palatable for poultry as Indian corn, and does not advise its use as a substitute for wheat for that class of stock. He states that opinion is divided as to its value for egg production.

ELEVATOR SCREENINGS.

For the purpose of ascertaining the feeding value of elevator screenings and certain separations therefrom, a series of feeding trials was undertaken by the Division of Animal Husbandry at the Central Farm, Ottawa, the material therefor being furnished by the Seed Commissioner. The screenings were obtained from the elevators at Fort William, Ont., and the feeds therefrom were finely ground before being used.

Laboratory No. 20429.—Complete screenings, and stated to consist of:—

Scalpings, 37 per cent.
Succotash flax, 7 per cent.
Buckwheat screenings, 18 per cent.
Black seeds, 38 per cent.

Laboratory No. 20428.—Screenings without black seeds.

Laboratory No. 20427.—Black seeds.

ANALYSIS of Elevator Screenings.

Constituent.	No. 20429	No. 20428	No. 20427
	Per cent	Per cent	Per cent
Water	9·04	10·32	9·72
Protein	13·00	14·25	16·37
Oil	7·64	5·67	12·43
Carbohydrates	51·68	61·81	43·48
Fibre	13·48	5·22	12·14
Ash	5·16	2·73	5·76
	100·00	100·00	100·00

Considered simply from the standpoint of composition, as revealed by the ordinary methods of feeding stuff analysis, the complete screenings would be adjudged a feed of very fair quality, moderately rich in protein, characterized by a high fat content, the only objectionable feature being a large percentage of fibre.

The "screenings without black seeds" differ from the complete screenings in possessing a somewhat higher protein content, a smaller, though notable, percentage of oil, and very much less fibre. This material, judging from the analysis, should prove superior as a feed to complete screenings.

The black seeds, consisting essentially of the seeds of tumbling mustard, wild mustard, lambs' quarters, and other fine weed seeds, are rich in protein, very rich in oil, with a fibre content practically equal to that of the complete screenings. Unfortunately the unpleasant pungency of the oil in many of these seeds makes this material distasteful and unpalatable to stock.

The composition of the various weed and other seeds making up elevator screenings is being ascertained, and it is hoped within the next year we may be in a position to publish a more or less complete report on the possible feeding value of this by-product.

POTATO CAKE.

Laboratory Nos. 17348 and 17572.—These two samples were forwarded from Berlin, Germany, for our consideration and opinion as to their feeding value. This cake, it is stated, results as a by-product in the treatment of potatoes by a "cold press process" for the extraction of certain nitrogenous compounds that find a use in the arts. The cake is somewhat similar in appearance to linseed cake, but is lighter in colour. It was quite sound and free from mould and any objectionable smell and apparently from any taste, but the small quantity furnished did not permit of any trial with stock to ascertain its palatability or comparative feeding value.

ANALYSIS of Potato Cake.

Constituent.	No. 1.	No. 2.
	Per cent	Per cent
Moisture	11·78	7·80
Protein	3·51	3·99
Fat	·18	·25
Carbohydrates	80·29	80·21
Fibre	2·60	6·07
Ash	2·04	1·68
	100·00	100·00

This is essentially a "starch" feed, poor in protein and containing little more than traces of fat. Though possibly possessing a fair digestibility, its nutritive value would be very low. Its use would necessitate the more costly feeds, rich in protein and fat, to ensure a balanced ration. Its composition clearly shows that it cannot rank among the class of feeds known as "concentrates," bought by farmers to enrich their home-grown fodders.

MIXED CONCENTRATES AND OAT CHOP.

Laboratory Nos. 16961 and 16999.—These two feeding stuffs were forwarded for comparison by a correspondent in New Westminster, B.C., who writes: "'the mixed concentrates' is manufactured by the Grain Growers British Columbia agency at New Westminster. I understand it is made from a mixture of grain, rice meal, distillery, and brewery by-products. The price is $28 per ton. The 'oat chop' is made locally, and sells at $30 per ton."

ANALYSIS of Mixed Concentrates and Oat Chop.

Constituent.	Mixed Concentrates.	Oat chop.
	Per cent	Per cent
Moisture	7·85	5·27
Protein	14·53	11·95
Fat	9·61	3·92
Carbohydrates	54·12	64·45
Fibre	7·73	10·92
Ash	6·16	3·49
	100·00	100·00

The superiority of the mixed concentrates, though sold at a lower price, is apparent from these data; it contains higher percentages of protein and fat, and has a lower fibre content. The oat chop is free from added hulls or other refuse matter, and is a good sample of feed as prepared from the grinding of fair quality oats.

CORN AND CLOVER ENSILAGE.

Laboratory No. 16801.—This ensilage, from the Experimental Station, Cap Rouge, Que., was made by alternately cutting and filling into the silo a load of corn and a load of second-crop clover. The silo is 14 feet in diameter and 33 feet in height. The sample for analysis was taken January 15, 1914, when the ensilage had been used to a depth of 15 feet from the top. At this height in the silo, each load occupied a depth of about 5 inches. A cube of 2 feet was cut out from the centre of the silo, and the whole thoroughly mixed.

ANALYSIS of Corn and Clover Ensilage.

Constituent.	As received.	Water-free material.
	Per cent.	Per cent.
Water	74·99	
Crude protein[1]	3·38	13·52
" fat	·78	3·12
Carbohydrates	12·79	51·13
Fibre	6·22	24·87
Ash	1·84	7·36
	100·00	100·00
[1]Albuminoids	2·95	11·80
Non-albuminoids	·43	1·72
Acidity, in terms of acetic acid	·31	1·24

Our examination of this ensilage, as received, would lead one to conclude that the larger proportion was corn; the amount of clover present did not appear to be more than 25 per cent of the whole. The corn stems were slight, cobs were absent; the corn was therefore essentially leaves. The ensilage was well preserved, and had a pleasant aroma.

The analytical results indicate a higher protein content than would be expected in a mixture of equal parts of corn and clover, as will be seen by a study of the following data for corn ensilage and clover ensilage, water-free, with those for the sample under discussion:—

Analysis of Corn and Clover Ensilage.

(Calculated on water-free material.)

Constituent.	Corn Ensilage.		Red Clover Ensilage.
	Decidedly Immature.	Fairly Mature.	
	Per cent	Per cent	Per cent
Crude protein	8·13	10·22	15·00
" fat	3·83	3·39	4·29
Carbohydrates	52·64	48·48	41·43
Fibre	28·72	29·91	30·00
Ash	6·70	8·00	9·28
	100·00	100·00	100·00

The ensilage in question is undoubtedly one of superior quality; from its excellent condition and its composition as revealed by chemical analysis it would assuredly prove a valuable and nutritious succulent roughage.

FROZEN SHREDDED CORN.

Laboratory No. 18688.—This sample was taken at the Experimental Farm, Indian Head, as the shredded corn was being put into the silo, August 29, 1914. The crop had been seriously injured by frost on August 9, but had been allowed to stand uncut until the 29th in the hope that some further growth might follow, but it did not recover. As viewed in the field the crop appeared very badly damaged, the greater number of leaves being dry and brittle. It showed no cobs. The variety was North Western Dent and was sown May 24. There had been no rain between the 9th and 24th August, with fairly high temperature.

Analysis—	Per Cent.
Water	83.80
Crude protein	2.80
" fat	.18
Carbohydrates	7.21
Fibre	4.34
Ash	1.67
	100.00

The large percentage of water indicates the immaturity of the corn and, of necessity, lowers the feeding value of the ensilage. The water content of corn when generally recognized to be in the best condition for the silo—the ears glazing and the lower leaves turning yellow—is between 70 and 75 per cent. Such a corn would contain, say, 25 per cent dry matter, as against 16·2 per cent in the present immature, frozen sample.

Frozen corn may make very good ensilage and, if the corn has been fairly mature, the product will not have suffered in quality. Such ensilage has been found to be relished by cattle, and does not appear to be in any way injurious to them. It would seem, therefore, desirable as the season draws to a close to leave a crop of immature corn for one or even two weeks and run the risk of it being frozen, for, if the frost does

not occur, the corn will probably increase in value by the gain of 5 to 10 per cent of dry matter.

As a rule it is advisable to get the corn into the silo as soon as possible after it has been frozen, as heavy rains would materially lower the feeding value of the now dead leaves.

OAT FODDER CURED GREEN AND AS ENSILAGE.

Laboratory Nos. 19779 and 20070.—These samples of ensilage from green oats and of cured green feed were forwarded from the Experimental Station at Lacombe, Alta., where they were used in a comparative feeding experiment with steers. The Superintendent at Lacombe writes: "This ensilage from green oats is much relished by the cattle, and we are conducting experiments to ascertain its food value as compared with that of fodders available here. The cured green feed is originally the same as that put in the silo, but it has been cured in the shock and stacked."

ANALYSIS of Oat Fodder and Oat Ensilage.

Constituent.	Oat Fodder.		Oat Ensilage.	
	As received.	Dry matter.	As received	Dry matter
	Per cent	Per cent	Per cent	Per cent
Water	12·91	....	60·40	
Crude protein	8·63	9·91	4·85	12·25
" fat	1·70	1·95	1·10	2·78
Carbohydrates	45·67	52·44	16·22	40·96
Fibre	24·33	27·93	14·18	35·81
Ash	6·76	7·77	3·25	8·20
	100·00	100·00	100·00	100·00

Comparing the oat fodder with the ensilage, both as received, weight for weight, 100 pounds of the former should have a feeding value, approximately, of 250 to 300 pounds of the latter. This deduction is made simply from the analytical data, and does not take into consideration the relative digestibility of the two fodders nor the value to be attached to the quality of succulency of the ensilage. We have no data as to the digestion coefficients of these materials, but it seems probable that there would not be any great differences between the fodder and the ensilage in these particulars. Succulency is a quality or property that it is difficult to value in exact terms in considering a fodder from the standpoint of its chemical composition, but we know that it frequently has a distinct value in the ration, especially in that of the dairy cow.

A study of the composition of the dry matter of the two feeds would indicate that the fermentative action in the silo has more particularly led to the destruction of a part of the carbohydrates, thereby increasing the relative proportions of crude protein and fibre. This is in accord with the action of ensiling on Indian corn. Probably the crude protein in the ensilage has not the same value as that of fodder, weight for weight, as in the processes of fermentation a portion of the true albuminoids is broken down into the less valuable form, from the nutritive standpoint, of amides and allied compounds.

UPLAND PRAIRIE HAY AND TIMOTHY HAY.

Laboratory Nos. 20444-5-6.—These fodders were forwarded from the Experimental Station at Lacombe, Alta., where they were used in feeding trials with steers during the winter 1914-15. Prairie hay No. 1 is stated to have been cured under more favour-

able weather conditions than No. 2. They are both considered to be representatives of fair quality prairie hay.

The notes taken on the hays as received are as follows: Timothy hay, rather dry and harsh, probably a little overripe when cut, rather short heads, clean, and with good aroma. Prairie hay No. 2, of fine quality, very few heads, of good green clour and pleasant aroma—in first-class condition. Prairie hay No. 2 consists of the same grasses as No. 1, a few heads only, slightly yellow and discoloured.

ANALYSIS of Upland Prairie and Timothy Hay.

Constituent.	Upland Prairie Hay.		Timothy Hay.
	No. 1.	No. 2.	
	Per cent	Per cent	Per cent
Water	4·52	4·76	4·56
Crude protein	7·53	7·50	5·58
" fat	3·14	3·39	3·59
Carbohydrates	45·33	47·87	44·58
Fibre	32·35	29·80	36·33
Ash	7·13	6·68	5·36
	100·00	100·00	100·00

The two samples of prairie hay are practically identical in composition, the only notable difference in composition being the slightly higher fibre content in No. 1.

Judging simply from the analyses, we should conclude that the prairie hay possessed a somewhat higher feeding value than the timothy, for the latter contains 2·0 per cent less crude protein, and a larger proportion of fibre.

OAT STRAW.

Laboratory No. 20545.—This was grown at the Experimental Station, Lacombe, Alta., in 1914, and used in feeding trials with steers. It was considered of interest to ascertain the composition of the straw cured under the climatic conditions of the West as compared with that of straw cured in Eastern Canada.

ANALYSIS of Oat Straw.

Constituent.	No. 20545	Average of many Analyses of Eastern oat straw.
	Per cent.	Per cent.
Water	4·39	9·2
Crude protein	5·99	4·0
" fat	1·78	2·3
Carbohydrates	44·66	42·4
Fibre	36·22	37·0
Ash	6·86	5·1
	100·00	100·00

It must be pointed out that the composition of straw depends in a large measure on the stage of growth at which the crop is cut—the greener the straw the more nutritious the fodder. This fact precludes the possibility of making any hard and fast conclusions from analyses as to the effect of climatic conditions on curing, unless the stage of growth at the time of cutting is the same for the straws compared. We are only safe in stating from the present work that this sample of western-cured oat straw has a somewhat higher protein content than that of oat straw in the East.

Miscellaneous.

CANNED SEA-URCHIN.

Laboratory No. 19752.—This product was put up in British Columbia by Mr. A. Ikeda, a Japanese engaged in extensive business operations in fishing and mining along the northern coast of that province. The analysis was made at the request of the Provincial Secretary of British Columbia, submitted through the Department of the Naval Service, Ottawa.

In forwarding the sample, which consisted of three, approximately 1-pound, tins, Mr. Ikeda writes as follows:

> "The sample being sent you is canned sea-urchin, gathered by myself this year in northern British Columbia waters. This article, I understand, has been used by the native Indians of this province as food. It is also similarly used by the people on the Mediterranean Sea, and our Japanese public have been eating them for centuries.
>
> "My desire is to introduce it to the general public of North America as a food, but before doing so wish to obtain a report as to its nutritive value from a governmental department at Ottawa."

The cans, as received, were in good order, and the contents quite sound.

The material is a thick orange-red paste, consisting of a mass of small eggs with a very little free fluid. It has a characteristic and rather strong odour, not altogether unlike that of anchovy.

All three cans were opened and the contents found to be similar as to condition and appearance. Material from two of the cans was separately analysed and the data obtained were practically identical, establishing the homogeneity of the product.

Analysis—	Per cent
Water	66·64
Albuminoids	12·01
Fat or oil	12·88
Ash	1·09

For the purposes of comparison we append the analyses of certain shell-fish.

Analysis of Shell-fish.

——	Water.	Albumin-oids.	Fat.	Ash.
	Per cent	Per cent	Per cent	Per cent
Crab, edible portion	77·1	16·6	2·0	3·1
Cray-fish, edible portion	81·2	16·0	·5	1·3
Lobster, edible portion	79·2	16·4	1·8	2·2

That this canned sea-urchin possesses a very considerable food value, our analysis distinctly shows. Though containing somewhat less protein than lobsters and crabs, it is distinctly richer in fat. Of what practical importance the sea-urchin might

become as an article of food, it is difficult to say; no doubt the taste is one that would have to be acquired, and the probability is that though the product is rich and piquant, its introduction would be very slow.

THE RELATIVE VALUE OF FIELD ROOTS.

In past reports of this Division we have emphasized the importance, from the nutritive as well as from the medicinal standpoint, of field roots in the ration of farm stock. They are palatable, appetizing and highly digestible; they have an appreciable feeding value, chiefly from the sugar they contain, and they are also useful in maintaining the health and thrift of the animal, due largely to their potash compounds.

This investigation, continued since 1904, has had for its object the determination of the relative feeding qualities of the more common field roots, a matter to which farmers have hitherto paid little attention. In roots the " dry matter," upon which this feeding value, as in all fodders, depends, is made up chiefly of sugar, starch, pectin, and other carbohydrates. Roots are not highly nitrogenous, and their percentage of fibre is usually low, the latter no doubt a factor of significance in aiding their digestion by the animal. It is evident from these considerations that the percentages of dry matter and sugar mark or measure their feeding properties—the larger the percentages the greater the value of the root.

All the varieties analysed and reported on in this work have been grown on the Central Experimental Farm, Ottawa.

MANGELS.

Twenty-four varieties have been submitted to analysis. Many of these have been examined in past years, but a number are now for the first time reported on. In the table that follows, the mangels are arranged in the order of their dry matter content. It will be seen that in a general way, but not invariably, the sugar content follows the dry matter. The size of the roots analysed is indicated by the " average weight of one root " recorded in the last column of the table.

TABLE I.—Analysis of Mangels, Central Experimental Farm, Ottawa, Ont., 1914.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of one Root.	
	p.c.	p.c.	p.c.	lb.	oz.
Giant Half Sugar White	82·80	17·20	9·26	2	2
Mammoth Long Red	85·32	14·68	6·47	1	14
Danish Sludstrup	85·58	14·42	8·40	1	11
Gate Post	85·60	14·40	8·0	2	11
Improved Mammoth Saw Log	85·96	14·04	8·39	2	0
Weibull's Ljusrod	85·96	14·04	8·69	1	2
Taaroji Barres	86·30	13·70	9·01	1	15
Prize Long Red	86·40	13·60	8·42	1	12
Weibull's Barres Rodgul	86·52	13·48	9·99	2	4
Giant Yellow Intermediate	86·96	13·04	7·80	2	0
Golden Tankard	87·46	12·54	7·01	1	14
Perfection Long Red	87·48	12·52	8·01	1	2
Mammoth Yellow Intermediate	87·56	12·44	7·00	2	3
Weibull's Cylinder Barres	87·56	12·44	7·97	2	4
Elvetham Mammoth	87·70	12·30	8·20	2	2
Weibull's Eckendorffer Red	87·94	12·06	6·53	2	8
Sludstrup Barres	87·94	12·06	5·76	2	8
Selected Yellow Globe	88·32	11·68	7·34	1	15
Yellow Leviathan	88·48	11·52	6·71	2	2
Giant Yellow Globe	88·84	11·16	6·32	2	1
Danish Eckendorffer Yellow	89·00	11·00	6·80	2	0
" Red	89·00	11·00	6·63	2	3
Weibull's Eckendorffer Gul	89 02	10·98	11·59	2	0
Weibull's Excelsior Rod	90·38	9·62	4·65	2	15

Although differences of note in dry matter, and hence in feeding value, are to be observed, the mangels of last season (1914) as grown on the Central Farm do not exhibit the wide "spread" in this regard that has been noticed in previous years of this investigation. The Giant Half Sugar White stands out by itself as decidedly superior to the rest of the series. The remainder, as regards dry matter, practically lie between 11·0 per cent and 14·5 per cent. Previous records have generally shown a number of varieties containing between 7 per cent and 11 per cent dry matter, and hence inferior to the goods now reported upon. The comparatively high and uniform results from the mangels of 1914 are probably due in part to the introduction of improved varieties not hitherto grown here, but the writer is of the opinion that it also in a large part is due to the favourable seasonal conditions for the root crop that prevailed during the latter summer months of last year. These conditions were conducive to the development of sugar—the chief element of feeding value in roots.

In the following table we present certain averages as obtained from this investigation since its inception in 1904. It will be observed that the results for 1914, both as regards dry matter and sugar, are higher than those of any preceding years.

TABLE II.—Mangels—Yield and Average Composition, 1904-1914.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield per Acre.		Dry Matter.	Sugar.
		Lb.	Oz.	Tons.	Lb.	p.c.	p.c.
1904	10	2	11	30	1,277	11·69	6·62
1905	17	3	9	39	369	10·04	4·67
1906	16	2	7	31	159	11·63	5·93
1907	10	2	11	27	680	12·64	7·46
1908	12	2	2	23	6[illegible]0	11·87	5·33
1909	14	3	5	28	920	11·21	6·21
1910	8	5	10	56	57	10·04	4·46
1912	23	2	9	29	61	9·51	6·43
1913	13	2	14	....	....	10·51	5·63
1914	24	2	1	23	50	12·79	7·75
Average for 10 years	....	3	0	32	29	11·19	6·05

INFLUENCE OF HEREDITY IN MANGELS.

While the character of the season has much to do with the relative richness of roots, there can be little doubt but that heredity plays an important part in this direction. To obtain data on this interesting point, namely, that a certain character as to composition may be transmitted, two well-known varieties of mangels—the Gate Post and the Giant Yellow Globe—were selected in 1900. These have been grown side by side yearly since that date under the same soil and seasonal conditions, and the comparison of the results as to dry matter and sugar makes a very interesting and instructive study.

TABLE III.—Dry Matter and Sugar in Gate Post and Giant Yellow Globe Mangels.

Season of Growth.	Gate Post				Giant Yellow Globe			
	Average Weight of One Root.		Dry Matter.	Sugar in Juice.	Average Weight of One Root.		Dry Matter.	Sugar in Juice.
	Lb.	Oz.	p.c.	p.c.	Lb.	Oz.	p.c.	p.c.
1900	....		11·14	6·15	....		8·19	2·64
1901	2	9	9·41	4·15	3	3	9·10	4·08
1902	3	2	13·90	9·39	3	9	10·24	5·24
1903	3	3	12·93	7·38	3	13	10·89	6·17
1904	2	14	12·64	7·62	2	13	9·24	5·26
1905	2	13	12·07	6·83	3	12	8·64	3·55
1906	2	2	12·90	6·59	1	8	12·73	6·45
1907	3	10	12·53	7·25	2	7	10·78	6·34
1908	1	11	12·02	4·94	2	4	10·66	4·47
1909	3	14	11·82	6·64	3	7	10·95	5·82
1910	6	8	9·59	4·26	6	13	7·80	2·74
1911	2	11	10·04	3·86	3	1	6·66	1·85
1912	3	5	8·98	5·05	3	2	7·87	4·75
1913	3	5	10·98	6·27	2	15	8·90	5·18
1914	2	11	14·40	8·00	2	1	11·16	6·32
Average for 15 years..	....		11·68	6·29	....		9·58	4·72

Thus, it will be seen, for fifteen years, without a single exception, the Gate Post has proved superior to the Giant Yellow Globe, both in dry matter and sugar, a fact which indicates that quality may be transmitted and, incidentally, that improvement in farm roots is possible by skilful work in selection and breeding.

TURNIPS.

Thirty varieties of turnip were analysed. A large number of the varieties now reported on were grown at the Central Farm for the first time in 1914. The series, however, includes certain turnips that have been examined for many years in this investigation.

TABLE IV.—Analysis of Turnips, Central Experimental Farm, Ottawa, Ont., 1914.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p.c.	p.c.	p.c.	Lb.	Oz.
New Century	89·00	11·00	·7	3	2
Hall's Westbury	89·00	11·00	·6	3	0
Haszard's Improved	89·20	10·8	·7	2	9
Canadian Gem	89·20	10·8	1·2	3	2
MagnumBonum	89·20	10·8	·7	3	0
Corning's Lapland	89·30	10·7	·7	2	15
Bangholm Selected	89·34	10·66	·6	2	0
Kangaroo	89·64	10·36	·7	2	6
Hartley's Bronze Top	89·80	10·20	·5	2	8
Weibull's Ostersunden	89·80	10·2	1·0	2	0
Oslgaard Bangholm Short-neck	89·80	10·18	·8	1	9
Halewood's Bronze Top	89·86	10·14	·5	2	10
Good Luck	89·90	10·1	·7	3	0
Shepherd's Golden Globe	90·00	10·0	·6	2	1
Paijirg Bangholm	90·00	10·0	·8	1	12
Mammoth Clyde	90·06	9·94	·4	2	3
Jumbo	90·10	9·9	·64	3	0
Empress	90·10	9·9	·5	3	1
Durham	90·10	9·9	·4	3	0
Weibull's Bangholm	90·40	9·6	1·1	2	2
Skirvings	90·62	9·38	·5	2	3
Perfection	90·80	9·2	·72	2	2
Best of All	91 00	9·0	·61	2	15
Greystone	91·50	8·5	·8	1	0
Weibull's Svensk Slat	91·60	8·4	·90	1	15
Danish Yellow Tankard	91·70	8·3	1·0	1	8
Dali's Hybrid	91·80	8·2	1·0	1	15
Fjusk Bortfielder	91·80	8·2	1·21	1	9
Weibull's Pedigree Bortfielder	92·20	7·8	1·24	2	12
Weibull's Sekel	92·60	7·4	1·10	2	0

The data show that between the best and the poorest in the series there is a difference of 3·6 per cent dry matter. Assuming that the feeding value is measured by the dry matter, this indicates that of the former 2,000 pounds are equivalent to 2,972 pounds of the latter—a matter of no small significance. Yield and keeping qualities are certainly questions to be considered in the selection of the varieties to grow, but our results with turnips, as with mangels, emphasize the desirability of paying some regard to the matter of composition.

Though in many instances the turnips closely approach or equal mangels in dry-matter content, they are decidedly inferior as a class to mangels as regards sugar.

Averages for yield and composition for the past nine years are given in the following table:—

TABLE V.—Turnips, Yield and Average Composition, 1905-1914.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield Per Acre.		Dry Matter.	Sugar.
		Lb.	Oz.	Tons.	Lb.	p.c.	p.c.
1905	20	2	13	30	1,060	10·09	1·10
1906	20	1	10	15	1,890	12·18	1·78
1907	14	3	5	33	142	10·14	1·11
1908	13	3	12	27	1,033	9·87	1·52
1909	13	2	10	29	542	11·30	1·43
1910	10	3	11	31	565	10·87	1·07
1912	19	3	12	33	155	8·65	1·10
1913	19	2	14	24	1,271	9·58	1·54
1914	30	2	0	22	130	9·68	·76
Average for 9 years						10·27	1·27

The average percentage of dry matter for the past season (9·68 per cent) is almost identical with that of 1913, but the sugar content is lower—0·76 per cent as compared with 1·54 per cent. In this latter particular the turnips of 1914 differ markedly from those of all previous years, the figures showing that for eight seasons the average sugar content is fairly constant at about 1¼ per cent.

CARROTS.

This series includes eight varieties, the larger number of which have already been examined in past seasons. White Belgian and Champion, as in 1913, are recorded as amongst those with the highest percentage of dry matter and sugar. The variety "James" analysed for the first time, appears particularly rich in sugar. The difference in dry matter between the best and the poorest of those examined is 2·0 per cent, or stated otherwise, 2,000 pounds of the former would have a feeding value equivalent to 2,370 pounds of the latter.

Though not differing markedly from turnips in their percentage of dry matter, carrots are decidedly richer in sugar.

TABLE VI.—Analysis of Carrots, Central Experimental Farm, Ottawa, Ont., 1914.

Variety.	Water	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	
	p.c.	p.c.	p.c.	Lb.	Oz.
Champion	87·20	12·80	3·02	0	12
White Belgian	87·80	12·20	2·02	0	10
James	88·40	11·60	4·09	0	8
Ontario Champion	88·70	11·30	2·00	0	10½
Mammoth White Intermediate	89·10	10·90	1·75	0	10
Giant White Vosges	89·10	10·90	2·57	0	12
Nantes	89·10	10·90	3·48	0	6
Improved Short White	89·20	10·80	2·03	0	10

The yield and average composition of the carrots examined during the past nine seasons are given in the following tabular scheme:—

TABLE VII.—Carrots—Yield and Average Composition, 1905-1914.

Year.	Number of Varieties Analysed.	Average Weight of One Root.		Yield Per Acre.		Dry Matter.	Sugar.
		Lb.	Oz.	Tons.	Lb.	p.c.	p.c.
1905	11	1	3	25	1,510	10·25	2·52
1906	10	1	2	19	1,605	10·59	3·36
1907	6	1	1	24	1,517	10·30	3·02
1908	6	1	3	22	133	10·89	3·34
1909	6	1	0	17	1,680	10·40	2·30
1910	5	1	9	13	1,640	10·17	3·23
1912	6	1	1	18	545	10·50	2·54
1913	6	1	8	24	1,100	9·11	2·11
1914	8	0	10	21	1,359	11·42	2·62
Average for 9 years						10·40	2·78

The carrots of 1914 were somewhat above the average in dry matter, with a sugar content almost identical with the average for the nine years of the investigation.

SUGAR BEETS FOR FACTORY PURPOSES.

For a number of years we have been obtaining data as to the quality of sugar beets as grown in various parts of the Dominion. As heretofore, four leading varieties have been sown on the Experimental Farms and Stations, fifteen in all, and representative samples of the harvested beets forwarded for analysis to the Chemical Laboratories at Ottawa, where the sugar-content and coefficient of purity were determined.

The seed of the varieties employed, Vilmorin's Improved A, Vilmorin's Improved B, French Very Rich, and Klein Wanzleben was obtained from the firms of Vilmorin, Andrieux et Cie., Paris, France, who have long made a specialty of the breeding of high-quality beets. As the seed distributed was all from the same stock, the results indicate variations in richness, etc., due to climatic, soil, and probably cultural conditions, prevailing in the several localities.

The localities at which this experiment has been carried on are as follows: Charlottetown, P.E.I.; Kentville and Nappan, N.S.; Fredericton, N.B.; Cap Rouge, Que.; Ottawa, Ont.; Brandon, Man.; Rosthern, Scott, and Indian Head, Sask.; Lethbridge, Alta.; Agassiz, Sidney, and Invermere, B.C.; the seed failed to germinate at Lacombe, Alta.

The results of the analysis, with certain other data of interest, are recorded in the following table. In the larger number of instances the beets were found to be eminently satisfactory, both as to richness and quality; it was at a few points only that the roots were below the standard required for factory purposes.

SUGAR BEETS grown on the Dominion Experimental Farms, 1914.

Variety.	Locality.	Percentage of Sugar in juice.	Percentage of Solids in juice.	Co-efficient of Purity.	Average Weight of one Root.		Yield per acre.	
		Per cent.	Per cent.	Per cent.	Lb.	Oz.	Tons.	Lb.
Vilmorin's Improved A	Charlottetown, P.E.I.	18·0	20·1	89·5	2	4	15	1,000
	Kentville, N.S.	16·90	19·25	87·8	–	14	16	736
	Nappan, N.S.	17·74	20·5	86·8	–	14	8	200
	Fredericton, N.B.	15·90	18·8	84·53	–	15	10	1,585
	Cap Rouge, P.Q.	14·27	17·25	84·67	–	1	5	600
	Ottawa, Ont.	19·89	23·0	86·50	1	4	14	400
	Brandon, Man.	11·28	18·25	59·3	2	4	19	1,294
	Rosthern, Sask.	12·90	16·33	79·0	2	5	7	92
	Scott, Sask.	15·03	17·29	86·94	–	12	9	
	Indian Head, Sask.	16·96	20·4	83·2	1	8	11	700
	Lethbridge, Alta. (Irrig.)	13·90	16·5	84·2	1	12	7	1,250
	" " (Non-irrig.)	14·88	18·0	82·6	1	10	9	
	Agassiz, B.C.	14·78	17·2	84·9	2	1	12	200
	Sidney, B.C.	14·9	16·26	91·4	3	3	4	900
	Invermere, B.C.	19·11	20·8	91·85	–	10	7	850
Vilmorin's Improved B	Charlottetown, P.E.I.	18·61	19·6	94·7	2	0	12	1,500
	Kentville, N.S.	17·30	20·03	86·4	–	14	14	248
	Nappan, N.S.	18·25	20·4	89·5	–	12	8	300
	Fredericton, N.B.	16·79	18·8	89·2	1	4	12	200
	Cap Rouge, P.Q.	15·23	17·3	90·18	1	1	5	500
	Ottawa, Ont.	20·07	23·1	86·90	1	1	13	800
	Brandon, Man.	11·10	19·0	58·40	2	2	22	1,424
	Rosthern, Sask.	12·42	16·49	75·34	2	8	7	1,277
	Scott, Sask.	15·55	18·47	84·20	–	9	8	1,000
	Indian Head, Sask.	16·77	20·2	83·97	1	10	11	550
	Lethbridge, Alta. (Irrig.)	11·60	17·8	65·2	1	4	6	600
	" " (Non-irrig.)	14·13	18·35	77·0	1	6	9	1,250
	Agassiz, B.C.	16·48	20·39	80·85	2	1	9	1,900
	Sidney, B.C.	15·5	17·31	89·5	1	10	6	400
	Invermere, B.C.	19·95	22·0	90·6	–	12	7	476
Klein Wanzleben	Charlottetown, P.E.I.	18·09	20·2	89·6	2	6	14	1,500
	Kentville, N.S.	17·25	20·33	84·8	1	1	15	1,904
	Nappan, N.S.	18·62	20·76	89·7	–	9	8	650
	Cap Rouge, P.Q.	14·18	17·0	85·31	1	2	5	200
	Ottawa, Ont.	20·95	24·1	25·17	1	2	13	1,150
	Brandon, Man.	11·23	20·0	36·14	2	4	20	1,072
	Rosthern, Sask.	12·76	15·63	81·66	2	6	4	1,773
	Scott, Sask.	14·97	17·83	84·00	–	10	8	1,000
	Indian Head, Sask.	16·48	19·7	83·75	1	5	10	350
	Lethbridge, Alta. (Irrig.)	13·46	16·2	83·0	1	8	7	50
	" " (Non-irrig.)	14·37	17·4	82·6	1	7	9	1,750
	Agassiz, B.C.	14·78	17·5	84·4	2	12	12	1,700
	Invermere, B.C.	18·51	21·4	86·5	–	12	8	1,061
French Very Rich	Charlottetown, P.E.I.	17·06	19·1	89·3	2	4	13	1,500
	Kentville, N.S.	16·85	19·23	87·5	1	–	16	1,704
	Nappan, N.S.	16·58	20·63	80·35	–	10	9	50
	Fredericton, N.B.	15·24	18·0	84·7	1	2	10	500
	Cap Rouge, P.Q.	13·72	16·56	84·53	1	1	2	1,500
	Ottawa, Ont.	18·46	21·2	85·86	1	7	14	200
	Brandon, Man.	14·63	16·5	88·66	2	12	16	912
	Rosthern, Sask.	11·70	14·43	81·10	2	7	8	179
	Scott, Sask.	13·14	15·63	84·04	–	9	8	750
	Indian Head, Sask.	15·97	18·7	85·4	1	5	12	200
	Lethbridge, Alta. (Irrig.)	12·85	16·5	77·9	1	10	6	1,000
	" " (Non-irrig.)	13·55	16·2	83·6	1	6	8	1,200
	Agassiz, B.C.	14·23	16·5	86·24	2	2	14	1,900
	Invermere, B.C.	18·58	20·6	89·2	1	–	8	1,226
Raymond Seed	Lethbridge, Alta. (Irrig.)	13·00	15·6	83·0	1	1	....	
	" " (Non-irrig.)	13·77	16·7	82·5	1	2	....	

From information supplied by the Superintendents, the following notes respecting the soil and season at the several Farms and Stations have been compiled:—

Charlottetown, P.E.I.—The soil is a sandy loam, in very good condition. The season generally was very favourable to the growing of roots, and the warm, sunshiny weather during the weeks in which they matured would materially assist in the development of sugar.

The results give evidence of a large crop of excellent quality, the percentage of sugar is very high in all three varieties, the average being 17·94 per cent, while the coefficient of purity is also most satisfactory.

Kentville, N.S.—The soil was a sandy loam of fair quality and the season for root crops must be considered throughout as good.

The yields per acre were very good, and the analytical results indicate a crop of superior quality. The first year of trial at this Station was 1913, when an average for sugar in juice of 17·17 per cent was obtained: the average for 1914 is practically identical, namely, 17·07 per cent.

Nappan, N.S.—The soil was a clay loam, underlaid by a subsoil of sand. Weather conditions were unfavourable till the middle of June. June and July were good growing months. Unsettled weather, dull, wet, and cold, commenced about the middle of September; hence conditions were not very favourable during the ripening period of the beets.

The sugar percentage in three of the four varieties is very high, though the average does not quite equal that of 1913. The beets grown at this Farm have almost invariably been characterized by an excellent sugar content. In the thirteen years of the investigation the average percentage of sugar has only three times fallen below 16·0 per cent.

Fredericton, N.B.—The soil is a moderately light sandy loam, in fairly good condition. The weather was cold and backward until August 1. From that until the roots were taken up (October 31) it was extremely favourable. The Superintendent reports the crop as poor.

The results generally show a root of good quality, the average sugar content for the three varieties grown being 15·98 per cent.

Cap Rouge, Que.—The soil is a sandy loam with a shaly subsoil at from 15 to 24 inches. The spring was rather early, with sufficient rain to start germination. The early part of June was somewhat dry, but there were good rains on the 25th, 29th and 30th of that month. A drought which lasted all through July until August 11 cut down the yield. Conditions subsequent to the latter date were good for the root crop.

It will be observed that the yields are exceedingly low.

As pointed out in our report of 1913, the sugar beet crop and, indeed, all roots on this Station for the previous three years had been a failure. An examination of the soil showed that it was sour and deficient in lime. To ascertain if therein lay the cause of the failure, lime was applied at the rate of 2 tons per acre between the 12th and 17th of May, 1914, and harrowed in, the land having been ploughed in the autumn of 1913. The root crops on the unlimed plots, left as a check, were a complete failure—not worth harvesting. The yield on the limed plots, though small, was much larger than those previously obtained, indicating that the liming had had a beneficial effect on the growth of roots on this soil. The experience with sugar beets was that with all the other classes of roots.

The sugar content was only fair, probably in a measure due to the unfavourable weather conditions already noted.

Ottawa, Ont.—The soil is a light, sandy one, in good condition, there being an ample supply of humus present.

The rainfall during the growing season was light, but the yield was fair. The beets were of excellent quality, a higher average for sugar content being obtained than for any previous season since the investigation began in 1902.

Brandon, Man.—The soil is a rich, black clay loam, with a high nitrogen content. The season throughout was considered as "decidedly dry."

The yield was very large, which is usually the case at this Farm.

The results as regards sugar content are much below the average, and the coefficient of purity is very low. As remarked in our report for 1913, occasionally beets with a satisfactory sugar content are obtained at this Farm, but, as a rule, the data do not indicate high quality either as regards sugar or purity.

Rosthern, Sask.—The surface soil is described as black, moderately heavy loam 6 inches in depth, underlaid by clay loam to the depth of 10 inches, then sand. It was summer-fallowed in 1913.

The first sowing did not germinate regularly owing to drought, and the "stand" was poor. A second sowing was made a month later. The yields on the several plots were irregular and, as a rule, light.

The data do not indicate a satisfactory beet for factory purposes, either as to sugar content or purity.

Scott, Sask.—The soil is a dark chocolate, moderately heavy loam; it was broken from prairie in 1913 and thoroughly worked.

The season was hot and dry, with insufficient rainfall. From April 1 to August 30 the precipitation was 8·09 inches. This fell in numerous light showers which seldom penetrated to the root zone of the beets. The roots, in consequence, were very small, and the yield per acre light.

The sugar content was rather low, and the indications generally for the production of a crop suitable for factory purposes are not favourable.

Indian Head, Sask.—The soil is a rich clay loam; it had been summer-fallowed in 1913, but was not manured.

After the seed had been sown there were no rains until a light shower on June 18, and the season generally was hot and dry, especially July, August, and September. As a result there was little growth till October, when the crop made a fair growth. The yield was only fair.

The average percentage of sugar, while much lower than that of 1913, is in fair accord with the average of previous years.

Lethbridge, Alta.—The soil is described as a "chocolate loam." The season was extremely dry during April, May, and most of June. This resulted in a very poor and irregular germination and a very poor "stand." The seed on the "irrigated" plot did not germinate till water was applied, May 29. A second irrigation was made July 29. There was plenty of rain in August and September, which brought the crop along and much benefited the yields. The Superintendent considers that owing to the irregular "stand," results, both as to quality and yield, are abnormal.

The sugar content of the beets on the non-irrigated land was, in all four varieties, higher than that of the beets grown with irrigation, but for both irrigated and non-irrigated it is below the average. The coefficients of purity are also decidedly low. In previous years, with one or two exceptions, this Station had produced beets, both on irrigated and non-irrigated land, of excellent quality for factory purposes. Presumably the wet weather of August and September prevented the beets from properly ripening.

Sugar-beet seed obtained from the sugar factory at Raymond, Alta., was also sown on irrigated and non-irrigated land. The results, generally, show a somewhat superior

root to those obtained from our own imported seed; as with the Vilmorin beet, the non-irrigated crop had a slightly higher sugar content.

Lacombe, Alta.—The seed failed to germinate owing to the extreme dryness of the soil, and in consequence there are no data to put on record.

Agassiz, B.C.—This is a rather poor sandy loam. It received 20 tons of half-rotted manure, 250 pounds of superphosphate, 150 pounds of muriate of potash, and 100 pounds of nitrate of soda per acre.

The early part of the season was unusually dry, but after September 7 it was very wet. The roots were taken up November 14.

The yield was light, not much more than half the crop usually obtained at this Farm.

The sugar content in all varieties was low, though indicating a beet that could be profitably used for sugar production. For a number of years previous to 1914, the quality of the sugar beets raised here had been of a very high order. The unfavourable data now recorded appear to be largely due to the exceptionally wet autumn, which naturally prevented the normal ripening of the roots and the proper development of sugar.

Sidney, B.C.—The soil is described as a black loam, underlaid with clay.

During June, July, and August it was very dry. In September the precipitation was 1·97 inches and from October 1 to 20, the latter the date of harvesting the crop, it was 3·38 inches.

The yield was very low. Two varieties only, Vilmorin's Improved A and B, were grown. They showed a fair percentage of sugar, with a high coefficient of purity.

Invermere, B.C.—The soil is described as a sandy, alluvial loam, deficient in humus. It was dressed in the spring with manure at the rate of 12 tons per acre, and 100 pounds of nitrate of soda after singling the roots.

The early part of the season was favourable for plant growth. During the latter summer months it was exceptionally hot and dry, necessitating an extra irrigation.

The yields were low, but the percentage of sugar and the coefficient of purity in every instance were very high and extremely satisfactory.

The following table will allow a comparison of the averages as regards sugar content obtained in this investigation since 1902:—

AVERAGE Percentage of Sugar in Juice in Sugar Beets grown on the Dominion Experimental Farms, 1902-14.

Locality.	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914
Charlottetown, P.E.I.	......	......	......	......	......	......	......	......	14·25	17·23	15·31	15·63	17·94
Kentville, N.S.	......	......	......	......	......	......	......	......	......	......	......	17·17	17·07
Nappan, N.S.	15·87	15·33	14·41	16·52	17·08	......	17·53	16·74	16·43	17·56	16·68	19·17	17·79
Fredericton, N.B	......	......	......	......	......	......	......	......	......	......	......	......	15·98
Cap Rouge, P.Q.	......	......	......	......	......	......	......	......	......	16·16	14·92	19·94	14·38
Ottawa, Ont.	16·77	15·34	16·91	12·45	14·37	15·44	16·30	14·84	16·44	......	17·59	16·48	19·84
Brandon, Man.	......	11·36	16·62	11·09	15·50	16·99	15·82	18·83	18·40	13·50	13·40	13·92	12·06
Rosthern, Sask.	......	......	......	......	......	......	......	......	......	13·30	14·63	15·61	12·69
Scott, Sask.	......	......	......	......	......	......	......	......	......	......	......	......	14·67
Indian Head, S'k	15·15	16·54	15·24	14·94	14·91	15·92	15·66	17·16	......	14·48	15·78	20·73	16·54
Lethbridge, Alta. (Irrig.)	......	......	......	......	......	......	16·09	17·91	......	17·02	17·41	19·54	12·95
Lethbridge, Alta. (Non-irrig.)	......	......	......	......	......	......	16·73	18·36	......	14·05	17·68	19·33	14·23
Lacombe, Alta.	......	......	......	......	......	13·34	11·21	12·77	12·69	......	......	12·67	......
Agassiz, B.C.	......	17·44	8·10	17·32	14·28	17·65	17·15	18·30	19·18	16·95	17·53	18·08	15·07
Sidney, B.C.	......	......	......	......	......	......	......	......	......	......	......	......	15·2
Invermere, B.C.	......	......	......	......	......	......	......	......	......	......	......	......	19·04

Beets were grown last year for the first time at the Stations at Fredericton, N.B., Scott, Sask., and Sidney and Invermere, B.C.

In the larger number of instances the results are quite satisfactory, indicating that beets suitable for sugar extraction may be grown at widely distant points in the Dominion. The average sugar content of the beets from two of the sixteen localities was over 19 per cent; at three, between 17 and 18 per cent; at four, between 15 and 17 per cent; at five, between 14 and 15 per cent; and at four, between 12 and 14 per cent.

THE FERTILIZING VALUE OF RAIN AND SNOW.

The chief object of this investigation, from an agricultural standpoint, is to determine the amount and character of the soluble nitrogen compounds in the rain and snow which, it may be supposed, serve to enrich the soil. Nitrogen is the dominant element of plant food, that is, crop growth is largely measured by the available nitrogenous food in the soil. The growth of crops removes nitrogen, and there is also a certain loss of soil nitrogen by bacterial activity, drainage, and other processes consequent upon tillage. Hence this research should afford data of interest and value in our study of the very important and vital problem of the up-keep of soil nitrogen. It may be added that this work, carried on at Ottawa, constitutes a Canadian contribution towards an inquiry into the fertilizing value of rain and snow which is receiving attention in other parts of the world. This fact enhances the value of our data.

This examination of rain and snow was commenced in 1907, and past reports of this Division record the results obtained during the first seven years of the investigation. The data for the eighth year closing February 28, 1915, are now recorded and discussed.

The year March, 1914, to February, 1915, inclusive, was, at Ottawa, particularly dry. The total precipitation (rain and snow) was only 25·34 inches, whereas for the previous twenty-three years the average was 34·34 inches, and this fact has very materially reduced the amount of nitrogen hitherto recorded as annually supplied to the soil by rain and snow.

During the twelve months, sixty-eight samples were analysed, forty-four of rain and twenty-four of snow, together representing the total precipitation of 25·34 inches.

In table I particulars are given of the monthly totals of precipitation and data for the monthly average nitrogen-content of the precipitation, present as free and albuminoid ammonia and as nitrates and nitrites. The calculations for the pounds of nitrogen per acre are also added.

TABLE I.—Rain and Snow at Ottawa, for the year ending February 28, 1915.

Month and Year.	Precipitation in Inches.			Nitrogen.				Pounds of Nitrogen per Acre.
	Rain.	Snow.	Total in Inches of Rain.	In Free Ammonia	In Albuminoid Ammonia	In Nitrates and Nitrites.	Total.	
1914.				p.p.m.[1]	p.p.m.	p.p.m.	p.p.m.	
March	0·40	9·75	1·37	·187	·196	·12	·503	·156
April	2·04	4·00	2·44	·476	·149	·137	·762	·427
May	0·30	....	0·30	·76	·15	·43	1·34	·091
June	2·21	....	2·21	·519	·082	·433	1·03	·518
July	1·41	....	1·41	·63	·12	·50	1·25	·400
August	2·38	....	2·38	·47	·60	·27	1·34	·725
September	2·09	....	2·09	·37	·163	·39	·92	·437
October	1·85	....	1·85	·62	·07	·36	1·05	·442
November	1·70	17·75	3·50	·38	·076	·29	·746	·446
December	0·66	18·00	2·46	·22	·161	·08	·46	·196
1915.								
January	0·97	21·50	3·12	·17	·16	·18	·51	·361
February	0·69	15·25	2·21	·13	·45	·71	1·29	·646
Total for 12 mons	16·70	86·25	25·34	....	....	....	....	4·905

p.p.m.=Parts per million.

We have already referred to the fact that the total precipitation for the year was much below the normal. The rainfall was particularly low, only 16·7 inches as compared with 25·14 inches, the average for the previous twenty-three years. May was exceptionally dry, with only ·30 inch. In three months, March, July, and October, the precipitation was between 1 and 2 inches, and in two months only, November and January, did it exceed 3·0 inches. Many of the showers during the growing season were exceedingly light, not furnishing a sufficient quantity, as collected on our experimental catchment area, for the purposes of analysis. These showers, though no doubt useful in refreshing vegetation, could not have added materially to the moisture content of the soil for subsequent crop use between rainfalls.

The total nitrogen for the year amounted to 4·905 pounds per acre, the average for the previous seven years being 6·182 pounds.

A study of table II permits a comparison of the annual precipitation and the amounts of nitrogen furnished per acre for the eight years that this examination has been in progress.

TABLE II.—Precipitation and Amount of Nitrogen per Acre, Ottawa, Ont., 1908-1915.

Year.	Rain in Inches.	Snow in Inches.	Total Precipitation in Inches of Rain.	Pounds of Nitrogen per Acre.
Year ending February 29, 1908	24·05	133·0	37·35	4·322
" " " 28, 1909	22·99	96·25	32·63	8·364
" " " 28, 1910	28·79	80·75	36·87	6·869
" " " 28, 1911	19·67	73·00	26·97	5·271
" " " 29, 1912	20·33	104·25	30·76	6·100
" " " 28, 1913	30·34	96·25	39·96	6·144
" " " 28, 1914	23·31	84·75	31·78	6·208
" " " 28, 1915	16·70	86·25	25·34	4·905
Average for 24 years	24·37	91·79	33·96	
" " 8 "	....	....	....	6·023

The data set forth in table III are of interest in showing the total nitrogen furnished per acre annually for the experimental period, 1908-1915, and in indicating the proportions of this nitrogen as found in the rain and snow respectively. The results allow us to conclude that from 80 to 85 per cent of the total nitrogen is to be found in the rain.

TABLE III.—Amounts of Nitrogen furnished by Rain and Snow, 1908-15.

Year.	Total.	By Rain.		By Snow.	
		Pounds.	Proportion.	Pounds.	Proportion.
	Pounds.		Per cent.		Per cent.
Year ending February 29, 1908	4·322	3·243	75	1·080	25[1]
" " " 28, 1909	8·364	7·528	90[2]	·836	10
" " " 28, 1910	6·869	5·830	85	1·040	15
" " " 28, 1911	5·271	4·424	84	·847	16
" " " 29, 1912	6·100	5·075	83	1·025	17
" " " 28, 1913	6·144	5·113	83	1·031	17
" " " 28, 1914	6·208	5·192	84	1·016	16
" " " 28, 1915	4·905	3·976	81	·929	19

[1]Snowfall exceptionally heavy.
[2]Rain abnormally rich in ammonia, due to bush fires.

The distribution or proportion of the various nitrogen compounds in the rain and snow is shown in table IV. The chief points of interest are the greater richness of the rain in the several nitrogen compounds, which has been observed from the first, and the somewhat larger than usual percentage of the total nitrogen of the rain present in the form of nitrates and nitrites.

TABLE IV.—Average Nitrogen content of Rain and Snow, Amount of Nitrogen per acre as Free and Albuminoid Ammonia and as Nitrates and Nitrites, 1914-15.

	Number of Samples Analysed.	Precipitation in Inches.	Nitrogen.								
			Parts per Million.				Percentage of Total.			Pounds per Acre.	
			In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	Total.	In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	As Free and Albuminoid Ammonia.	As Nitrates and Nitrites.
Rain	44	16·70	·400	·214	·450	1·064	38	20	42	2·320	1·702
Snow	24	86·25	·176	·116	·159	·451	39	26	35	·571	·312

As remarked in previous reports, the amount of soluble nitrogen compounds that may serve as food for crops as furnished annually by the rain and snow is not large and cannot be regarded as an important factor in adding to the soil's store of nitrogen. We may, however, fairly assume, since this nitrogen is furnished in an immediately available form chiefly during the growing season, that the precipitation does act as a fertilizing agent of some value.

WELL WATERS FROM FARM HOMESTEADS.

The examination of well waters from farm homesteads, a work begun in the early days of the Farm's history, has been continued. During the year ending March 31, 1915, one hundred and ninety-five samples have been submitted to analysis and reported upon as to the wholesomeness of the supplies represented. A summary of the data is here given in tabular form, together with a very brief report as to the nature and potability of the water. To the sender, a more detailed report is forwarded, explaining the nature of the pollution (where such has been found) and the possibilities of purification.

In addition to the waters submitted to analysis, a considerable number of samples have been received which, owing to insufficient quantity, dirty containers or other cause which would vitiate the analytical results, have not been examined.

The summarized reports as to quality given in the last column of the table show that forty-nine were pronounced as pure and wholesome, fifty-four as suspicious and probably dangerous, thirty-six as very seriously polluted, while fifty-six samples were too saline for potable use.

The whole subject of the farm water supply has been repeatedly and recently discussed in the reports of this Division, and we think it scarcely necessary in this chapter to consider it in all its phases. Very briefly, the cause of pollution in the larger number of instances is the access to the well of drainage of an excretal character, from the stable, barn, or privy. The polluted wells, for the most part, are shallow, merely collectors of soakage water from the surrounding soil. When these wells are, for the sake of convenience, located near the farm buildings or in the barnyard, as is too frequently the case, contamination is practically inevitable.

The bored or drilled well, tapping a deep-seated source, is undoubtedly safer and more reliable than the shallow, ground-water well. Where the latter must be relied on, the surroundings for a radius of say 50 yards should be kept free from manure and filth. Preferably, this area should be sodded. As a further precautionary measure the shallow well may be lined to a depth of 10 or 12 feet and to a thickness of, say, 4 to 6 inches with cement or puddled clay, the lining projecting say, 6 to 12 inches above the mouth of the well, which should be protected with a well-fitting cover to keep out frogs, mice, etc.

An ample supply of pure water is assuredly one of the most valuable assets that a farm can possess, and no reasonable expense should be spared in the attempt to procure it. Impure water is always a menace; it is frequently the cause of typhoid fever, diarrhoea, and allied intestinal diseases. Pure water is one of the most potent factors for the good health of the farmer and his family, for the thrift of his stock, and the quality and wholesomeness of his dairy produce.

If the supply has been proved impure, our advice is abandon it at the earl opportunity; no matter what means of purification are employed, such water must remain a source of more or less danger, for household purification methods can seldom be depended on at all times to give a satisfactory and absolutely safe water. As, however, it is not always possible to obtain immediately a pure supply, we would recommend the adoption of one or other of the two following methods, if analysis or the condition of the well or water point to pollution:

I. Boiling.—This will not make a bad water good, but it will destroy any disease germs that may be present. Boiling for ten or fifteen minutes all the water required for drinking or culinary purposes is the best safeguard that we can suggest.

II. Treatment with hypochlorite.—This method is strongly recommended by many sanitarians. It is carried out for a supply for the household, as follows:—

"Take a level teaspoonful of chloride of lime and rub with a small quantity of water to the consistency of cream and until the lumps have disappeared. Dilute this

with water, constantly rubbing and stirring, to a volume of about four cupfuls, and pour into a stoppered or well-corked bottle. This is the stock solution, of which a teaspoonful is added to every two gallons of the water to be treated. Stir well. In from ten to fifteen minutes all disease germs will be destroyed and the water will be safe. The stock solution will keep for at least a week. The chloride of lime should be purchased in metallic cases (tins) not cardboard boxes, which permit of its deterioration."

It will be observed that a number of the waters have been reported as saline. This means that their soluble mineral content is so high as to render them non-potable, or practically so, or that the character of this mineral matter is such as to make the waters more or less deleterious to health if continuously used. Very frequently the two conditions are associated and the high saline content is found to be made up in part of salts that have a decidedly medicinal effect on the system. In addition to sodium chloride (common salt), to which, unless in great excess, no great importance from the hygienic point of view need be attached, and calcium sulphate (sulphate of lime), which may be regarded as merely making the water excessively hard, we not infrequently find notable amounts of the sulphates of magnesium and sodium (Epsom salts and Glaubers salts) which impart a bitter taste to the water. Furthermore, these two compounds, if present in more than traces, render the water decidedly laxative. Though some systems in time become, in a large measure, habituated to the use of these impregnated waters, without apparently any serious symptoms developing, we cannot regard such supplies as wholesome, either for stock or domestic use. These saline waters for the most part are from districts of sparse and irregular precipitation, and where, as a result, a ground water supply cannot be depended on. They are as a rule from deep wells, which no doubt draw their supply from strata containing these soluble minerals.

Unfortunately this saline matter cannot be got rid of by any filtration or precipitation method practicable in the household, owing to its extreme solubility. Distillation must be resorted to; this will furnish a wholesome, potable water from the most highly impregnated supplies. In order that the farmer may avail himself of this method of purification, we recommend the use of a domestic or household still. These stills, several of which are upon the market, can be procured from firms dealing in druggists' supplies. They are simple in operation and can be used on the kitchen stove. The more commonly used sizes will furnish from one to two quarts of pure water per hour—a sufficiency for drinking purposes in the household—and the cost is from $10 to $15 apiece according to size, materials, and construction. Further information respecting these domestic stills, if required, can be obtained by addressing this Division.

In conclusion, we would say that if the farmer has any reason to doubt the purity of his supply he should have a sample examined. Farmers are invited to write to the Division of Chemistry, Central Experimental Farm, Ottawa, for a copy of the directions to be followed in the collection and shipment of the sample. No charge is made for the analysis, but the instructions furnished must be faithfully carried out, and the express charges on the water prepaid. Samples which have not been taken in accordance with our directions cannot be analysed.

ANALYSIS OF WELL WATERS, 1914-1915— Results Stated in Parts per Million.

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Report.
1	Spences Bridge, B.C.	J.A.T.	6-4-14	....	....	....	6.0	720.0	450·0	270·0	Wholesome.
2	Spences Bridge, B.C.	J.A.T.	6-4-14	....	....	....	Free.	1,640·0	1,290·0	350·0	Slightly saline but wholesome.
3	Marshy Hope, N.S.	A.G.	6-4-14	·06	·20	·61	5·5	40·0	31·2	88·0	Suspicious.
4	Pickering, Ont.	H.D.B.	7-4-14	3·40	·48	Free.	190·0	960·0	816·0	144·0	Non-potable.
5	Carp, Ont.	O.M.G.	9-4-14	·03	·30	5·39	4·5	411·2	304·0	107·2	Suspicious.
6	Macleod, Alta.	E.N.	9-4-14	·12	·25	Free.	Free.	264·0	168·0	96·0	Non-potable.
7	St. Augustin, Que.	J.E.	9-4-14	·066	·317	1·40	Free.	140·0	80·0	60·0	Suspicious.
8	Camrose, Alta.	G.E.R.	14-4-14	1·55	·20	Free.	1,840·0	3,360 0	3,180·0	180·0	Strongly saline.
9	C. E. F., Ottawa.	....	15-4-14	·04	·06	1·16	7·5	311·2	231·2	80·0	Free from pollution.
10	Milford, Ont.	N.V.D.	15-4-14	·22	·22	5·36	850·0	1·653·2	1,452·0	201·2	Seriously polluted.
11	Finch, Ont.	F.D.S.	16-4-14	280·0	140·0	Free.	200·0	1,620·0	620·0	1,000·0	Polluted.
12	Invermere Co., C.B., N.S.	A.C.R.	21-4-14	·08	·06	·22	2,750·0	4,398·0	4,298·0	1,000·0	Strongly saline.
13	Big Stick Lake, Sask.	R.H.A.	24-4-14	3·58	1·52	·97	170·0	1,700·0	1,075·0	625·0	Unwholesome.
14	Bowesville, Ont.	J.S.M.	24-4-14	·03	·07	Free.	Free.	200·0	134·0	66·0	Excellent.
15	Bowesville, Ont.	J.S.M.	24-4-14	·06	·10	11·30	65·0	406·0	268·0	138·0	Seriously polluted.
16	Manitou, Man.	J. J. M.	27-4-14	1·16	·12	·27	4·5	488·8	388·0	100·8	Seriously polluted.
17	Grand Mannan, N.B.	S.H.J.	29-4-14	Free.	·04	·05	17·5	104·0	50·0	54·0	Wholesome.
18	Avonlea, Sask.	J.S.N.	9-5-14	·315	·215	·037	120·0	4,000·0	3,440·0	560·0	Strongly saline.
19	Aylmer, Que.	A.C.C.	11-5-14	·21	·06	Rree.	24·0	340·0	272·0	68·0	Seriously contaminated.
20	Tullisville, Sask.	L.A.P.	11-5-14	1·24	·28	Free.	170·0	2,480·0	1,840·0	640·0	Contaminated.
21	Beulah, Man.	C.E.E.	12-5-14	4·52	·19	Free.	450·0	2,912·0	2,612·0	300·0	Strongly saline.
22	Lombardy, Ont.	H.R.C.	12-5-14	·21	·20	4·38	27·0	....	....	....	Seriously contaminated.
23	Newboro', Ont.	J.M.T.	13-5-14	·34	·17	1·78	110·0	430·0	310·0	120·0	Polluted.
24	Carp, Ont.	E.R.K.	19-5-14	·12	·14	5·57	34·5	540·0	392·0	148·0	Seriously polluted.
25	Ottawa, Ont.	D.W.R.	20-5-14	·10	·14	5·40	12·0	296·0	180·0	116·0	Suspicious.
26	Ottawa, Ont.	J.B.	20-5-14	·12	·08	3·93	13·5	352·0	218·0	134·0	Suspicious.
27	Rosthern, Sask.	W.A.M.	22-5-14	4·76	·22	Free.	46·0	2·816·0	2·456·0	360·0	Non-potable, saline.
28	Rosthern, Sask.	W.A.M.	22-5-14	4·76	·22	Free.	46·0	2·816·0	2·456·0	360·0	Non-potable.
29	Theodore, Sask.	H.P.S.	22-5-14	·15	·16	3·51	17·0	1,372·0	1,020·0	352·0	Saline.
30	Laurentain View, Ont.	J.A.S.	23-5-14	Free.	·02	2·74	6·0	292·0	192·0	100·0	Free from contamination
31	Dunham, Ont.	G.H.F.	27-5-14	Trace.	·09	2·87	4·5	114·0	49·2	64·8	Suspicious.
32	Compton, Que.	L.J.	28-5-14	Free.	·055	1·85	2·0	234·0	140·0	94·0	Free from pollution.
33	Medicine Hat, Alta.	G.R.T.	1-6-14	....	....	....	17·5	1,475·0	1,065·0	410·0	Slightly saline.
34	Russell, Man.	J.A.M.	2-6-14	·225	2·60	Free.	·05	769·6	474·4	295·2	Suspicious.
35	Aylmer, Que.	J.C.R.	5-6-14	·14	·32	·016	5·5	231·0	136·0	95·0	Suspicious.
36	Albert Head, Vancouver Is.	M.M.	8-6-14	....	....	....	2·5	250·0	150·0	100·0	Free from pollution.

ANALYSIS OF WELL WATERS, 1914-15.—Results stated in Parts per Million.—*Continued.*

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 165° C.	Solids after Ignition.	Loss on Ignition.	Report.
37	Parkland, Alta	W.B.	8–6–14	·12	·08	·165	39·0	2,072·0	2·012·0	60·0	Saline.
38	Thompson, Alta	J.J.E.	10–6–14				15·0	400·0	250·0	150·0	O. doubtfull purity.
39	Kemptville, Ont	W.J.P.	10–6–14	Free.	·09	3·86	5·5	246·0	111·0	135·0	Suspicious.
40	Ramsayville, Ont	J.H.K.	12–6–14				5·100·0	8,450·0			Saline.
41	Point du Chene, N.B	J.S.M.	17–6–14	Trace.	·04	6·63	65·0	400·0	232·0	168·0	Gravely suspicious.
42	C.E.F., Ottawa		13–6–14	Free.	·02	1·119	8·0	352·0	272·0	80·0	Pure and wholesome.
43	Nicolet, Que	S.S.H.	13–6–14	8·88	·88	Free.	2,650·0	5,528·4	5,270·4	250·0	Strongly saline.
44	Ottawa, Ont	G.H.	15–6–14	·18	·08	2·36	15·5	328·0			Gravely suspicious.
45	Perley, Sask	F.N.N.	25–6–14				17·5	5,650·0			Strongly saline.
46	Macdonald, Man	R.A.C.	15–6–14	3·08	·05	Free.	2,400·0	7,202·0	6,258·0	944·0	Strongly saline.
47	Almonte, Ont	P.C.D.	16–6–14	·215	·17	6·75	55·0	630·0	482·0	148·0	Contaminated.
48	Almonte, Ont	J.J.H.	16–6–14	Free.	·12	2·10	55·0	518·8	438·0	80·8	Gravely suspicious.
49	Milk River, Alta	S.B.	26–6–14	1·69	·07	Free.	48·5	1,860·0	1,744·0	116·0	Saline.
50	Black Foot, Alta	C.H.L.	22–6–14				50·0	2,326·0	1,802·0	524·0	Strongly saline.
51	Aultsville, Ont	E.D.F.	22–6–14	·04	·02	·165	5·0	264·0	178·0	86·0	Pure and wholesome.
52	Whitla, Alta	A.E.S.	24–6–14	·065	·11	·045	10·0	1,938·0	1,818·0	120·0	Saline.
53	Maxville, Ont	D.McD.	26–6–14	·166	·166	21·08	200·0	720·0	262·0	358·0	Seriously polluted.
54	Winnifred, Alta	P.O.W.	26–6–14	Free.	·02	·36	9·0	1,624·0	1,392·0	232·0	Saline.
55	Fort Qu'Appelle, Sask	W.M.T.	29–6–14	·08	·10	Free.	46·0	1,541·2	1,249·2	292·0	Saline.
56	Fort Qu'Appelle, Sask	W.M.T.	29–6–14	·82	·26	Free.	61·0	2,106·0	1,708·0	398·0	Saline.
57	York Mills, Ont	M.W.B.	30–6–14	·075	·10	Free.	2·0	645·2	517·2	128·0	Free from contamination
58	York Mills, Ont	M.W.B.	30–6–14	·075	,16	Free.	6·0	328·0	248·0	80·0	Free from contamination
59	Allan, Sask	H.J.J.	2–7–14				24·0	2,552·2	2,013·2	542·0	Strongly saline.
60	Lancaster, Ont	A.F.C.	4–7–14	·06	·24	Free.	88·5	648·0	313·0	335·0	Suspicious.
61	Chateauguay, Que	L.S.M.	6–7–14				16·0	610·0	480·0	130·0	Probably wholesome.
62	C.E.F., Ottawa		8–7–14	Free.	·04	1·24	8·5	354·8	273·6	81·2	Pure and wholesome.
63	Westboro, Ont	R.	8–7–14	·06	·08	3·38	17·0	516·0	354·0	162·0	Suspicious.
64	Lakefield, Ont	J.C.	8–7–14	1·82	·08	Free.		426·0	338·0	88·0	Contaminated.
65	Norwood, Ont	G. L.	8–7–14	Free.	·09	2·67	8·5	334·0	289·2	44·8	Suspicious.
66	Banff, Alta	D.P.M.	9–7–14	Free.	·03	·066	Free.	172·0	95·2	76·8	Pure and wholesome.
67	Carp, Ont	E.H.G.	10–7–14	·125	·26	5·34	33·0	504·0	402·0	102·0	Seriously contaminated.
68	Rosthern, Sask	E. F.	10–7–14	·21	·05	·22	4·0	308·0	280·0	28·0	Not a first-class water.
69	Woodlawn, Ont	J.A.M.	11–7–14	·22	·09	·08	3·5	255·6	221·6	34·0	Very suspicious
70	Haley, Ont	A.M.H.	13–7–14	·04	·41	Free.	60·0	946·0	598·8	347·2	Probably dangerous.
71	Cowichan, B.C	M.W.C.	13–7–14	Free.	·11	·033	19,000·0	32,067·0	28,233·0	3,834·0	Strongly saline.
72	Westboro, Ont	P.C.	15–7–14	·03	·03	0·00	3·5	149·6	121·6	28·0	Pure and wholesome.
73	Kitimat, B.C	G.L.A.	16–71–4	·11	·17	Free.	140·0	349·6	265·6	84·0	Suspicious.

74	Blackfoot, Alta	C.H.L.	15-7-14	·20	·90	3·30	53·5	2,662·0	2,086·0	576·0	Saline.
75	Expanse, Alta	R.A.	17-7-14	Trace.	·20	·08	300·0	8,212·0	7,290·0	922·0	Strongly saline.
76	Lennoxville, Que	E.F.	18-7-14	2.25	·198	10·82	32·0	274·0	160·0	114·0	Seriously polluted.
77	Lennoxvile, Que	E.F.	18-7-14	·01	·049	2·57	5·0	140·0	93·0	47·0	Not a first-class water.
78	Lennoxville, Que	E.F.	18-7-14	·194	·07	1·01	1·8	63·0	36·0	27·0	Gravely suspicious.
79	Lennoxville, Que	E.F.	18-7-14	·01	·02	2·68	9·8	250·0	155·0	95·0	Suspicious.
80	South Bay, N.B	F.H.	21-7-14	·01	·01	·23	12·0	132·0	91·0	41·0	Excellent.
81	Grenfell, Sask	F.J.	25-7-14	·76	·73	....	70·0	6,468·0	5,373·0	1,095·0	Strongly saline.
82	Macleod, Alta	E.H.M.	28-7-14	....	....	....	2·5	410·0	384·0	26·0	Probably a good water.
83	Glen Nevis, Ont	J.S.M.	1-8-14	....	....	....	700·0	2,442·0	2,140·0	302·0	Saline.
84	Parkland, Alta	J.S.	31-7-14	....	....	....	....	3,240·0	3,169·0	71·0	Saline.
85	Collins, Sask	W.K.B.	7-8-14	2·82	·12	Free.	26·5	2,615·0	2,180·0	435·0	Saline.
86	Plantagenet, Ont	P.C.D.	4-8-14	....	....	....	3·0	154·0	136·0	18·0	Suspicious.
87	Mille Roche, Ont	A.S.	4-8-14	....	....	....	....	292·0	244·0	48·0	Probably a good water.
88	Ottawa, Ont	B.L.	4-8-14	·37	·075	·06	40·0	405·0	376·0	29·0	Dangerous.
89	Almonte, Ont	J.M.	6-8-14	·088	·045	2·92	57·0	555·0	489·0	66·0	Contaminated.
90	Fredericton, N.B	A.R.M.	7-8-14	·51	·17	....	30·0	238·0	130·0	108·0	Seriously polluted.
91	Ardock, Ont	W.J.C.	11-8-14	Trace.	·13	8·07	76·0	618·0	412·0	206·0	Seriously polluted.
92	Tillsonburg, Ont	V.W.	14-8-14	·16	·02	Free.	4·0	446·4	415·2	31·2	Suspicious.
93	Tillsonburg, Ont	V.W.	14-8-14	·01	·02	·1	Free.	337·6	289·6	48·0	Pure and wholesome.
94	Tillsonburg, Ont	V.W.	14-8-14	Free.	·03	4·12	122·0	695·2	466·4	228·8	Contaminated.
95	Arborfield, Sask	W.E.L.	4-8-14	....	....	....	350·0	8,982·0	7,537·0	1,445·0	Saline.
96	Elgin, Ont	W.H.P.	14-8-14	....	....	....	64·0	1,024·0	762·0	262·0	Suspicious.
97	Agassiz, B.C	S.F.	18-8-14	....	....	....	Free.	....	....	....	Non-potable.
98	Agazziz, B.C	S. F	18-8-14	....	....	....	Free.	....	....	....	Non-potable.
99	Cayley, Alta	H.S.	20-8-14	·85	·13	Free.	70·0	2,429·0	2,364·0	65·0	Strongly saline.
100	Beachburg, Ont	W.Mc.	22-8-14	·14	·05	·12	5·0	256·0	180·0	76·0	Contaminated.
101	Stafford, Ont	H.B.H.	25-8-14	·12	·20	·016	24·0	462·8	360·8	102·0	Polluted.
102	Plantagenet, Ont	.D.	27-8-14	·08	·15	·30	2·5	140·8	84·8	56·0	Free from pollution.
103	E. Kelowna, B.C	L.H.	29-8-14	·04	1·60	·07	1·0	150·0	80·0	70·0	Suspicious.
104	S. Indian, Ont	J.Mc.	31-8-14	·04	·16	·20	45·5	422·0	264·0	158·0	Suspicious.
105	Banff, Alta	D.P.M.	10-9-14	·033	·10	·039	0·75	235·0	155·0	80·0	Free from pollution.
106	St. Hyacinthe, Que	J.C.D.	4-9-14	·04	·08	Free.	340·0	1,104·8	853·8	246·0	Slightly saline.
107	St. Hyacinthe, Que	J.C.D.	4-9-14	5·26	·54	·74	....	....	....	....	Seriously polluted.
108	C. E. F., Ottawa	....	11-9-14	Free.	·02	1·04	9·5	338·4	258·0	80·4	Pure and wholesome.
109	Summerland, B.C	J.A.K.	22-9-14	....	....	....	20·0	1,233·6	934·4	299·2	Saline.
110	Summerland, B.C	J.A K.	22-9-14	....	....	....	2·5	230·8	172·4	58·4	Saline.
111	Brandon, Man	E.F.	22-9-14	·645	·13	Free.	32·5	502·4	396·0	106·4	Seriously polluted.
112	St. Eugene, Ont	E.P.L.	24-9-14	·175	·36	5·60	62·0	652·4	460·4	192·0	Seriously polluted.
113	Todmorden, Ont	J.C.W.	29-9-14	·045	·42	2·70	270·0	1,703·2	1,086·8	616·4	Gravely suspicious.
114	Sardis, B.C	L.M.	1-10-14	....	....	....	Free.	1·53	99·5	53·5	Free from pollution.
115	Sardis, B.C	L.M.	1-10-14	....	....	....	Free.	211·5	141·0	70·5	Free from pollution.
116	Sardis, B.C	L.M.	1-10-14	....	....	....	Free.	299·5	195·5	104·0	Free from pollution.
117	Sardis, B.C	L.M.	1-10-14	....	....	....	Free.	241·5	....	....	Free from pollution.
118	Sardis, B.C	L.M.	1-10-14	....	....	....	Free.	156·5	....	....	Free from pollution.
119	Sardis, B.C	L.M.	1-10-14	....	....	....	Free.	185·5	....	....	Free from pollution.
120	Elmsdale, P.E.I	W.C.Mc.	2-10-14	·03	·06	3·30	44·0	187·0	86·3	100·7	Gravely suspicious.
121	Carp, Ont	E.H.C.	6-10-14	·10	·155	5·73	12·0	230·0	152·0	78·0	Seriously polluted.
122	Sidney, B.C	S.S.	6-10-14	·20	·335	3·17	10·5	212·4	98·4	114·0	Seriously polluted.
123	Sidney, B.C	S.S.	6-10-14	·04	·03	3·30	10·0	170·4	93·6	76·8	Suspicious.

ANALYSIS OF WELL WATERS, 1914-15.—Results stated in Parts per Million.—*Continued.*

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Report.
124	Sidney, B.C.	S.S.	6-10-14	·04	·04	3·37	11·5	128·8	76·8	72·0	Highly suspicious.
125	Sidney, B. C.	S.S.	6-10-14	·004	·04	·014	8·0	168·0	108·8	59·2	Excellent.
126	Rereshill, Sask.	D.M.	7-10-14	....	....	....	12·0	1,585·0	1,370·0	215·0	Saline.
127	C. E. F., Ottawa	....	8-10-14	Free.	·01	1·17	8·5	388·4	218·8	169·6	Pure and wholesome.
128	Waseca, Sask.	H.H.	13-10-14	....	....	....	Free.	800·8	638·8	162·0	Safe and wholesome.
129	Wyman, Que.	M.M.	16-10-14	Trace.	·04	·26	Free.	295·0	195·0	100·0	Free from pollution.
130	Queens Co., N.B.	J.	17-10-14	....	....	....	Free.	122·0	38·0	84·0	Free from pollution.
131	Gravelbourg, Sask.	C.H.H.	21-10-14	·037	·33	·099	4·5	615·0	320·0	295·0	Not a first-class water.
132	Orillia, Ont.	R.A.H.	26-10-14	·105	·045	·045	1·0	378·0	278·0	100·0	Suspicious.
133	Jacquet River, N.B.	F.M.D.	30-10-14	·04	·105	6·37	36·0	242·0	188·0	54·0	Suspicious.
134	Orillia, Ont.	R.A.H.	26-10-14	Free.	·004	·99	·7	254·0	158·0	96·0	Excellent.
135	Sydenham, Ont.	W.E.L.	31-10-14	1·40	·05	7·10	3,650·0	8,200·0	6,195·0	2,005·0	Strongly saline.
136	Henryville, Que.	A.E.Mc	31-10-14	·19	·19	16·63	100·0	1,200·0	860·0	340·0	Strongly suspicious.
137	Chesterville, Ont.	H.J.J.	2-11-14	1·05	·056	Free.	400·0	1,310·0	945·0	365·0	Polluted.
138	Henryville, Que.	E.R.	3-11-14	·81	·07	Free.	64·0	600·0	400·0	200·0	Suspicious.
139	Lotbiniere, Que.	U.H.	7-11-14	4·08	·24	Free.	425·0	7,405·0	7,240·0	165·0	Strongly saline.
140	Leavitt, Alta.	J.F.H.	7-11-14	·01	·17	1·73	28·0	4,060·0	3,110·0	950·0	Strongly saline.
141	Harrowsmith, Ont.	W.E.L.	7-11-14	1·56	·04	3·04	4·100·0	9,478·0	7,108·0	2,370·0	Strongly saline.
142	Grondines, Que.	E.A.	9-11-14	·03	·18	11·50	18·0	426·0	248·0	178·0	Contaminated.
143	North Portal, Sask.	B.B.	10-11-14	....	....	....	64·0	1,768·0	1,656·0	112·0	Saline.
144	Maple Dale, Sask.	H.S.H.	14-11-14	....	....	....	175·0	4,960·0	4,224·0	736·0	Strongly saline.
145	C. E. F., Ottawa	....	16-11-14	·05	·07	·95	9·5	322·0	230·0	92·0	Pure and wholesome.
146	Billing's Bridge, Ont.	H.I.	16-11-14	·44	·04	Free.	4·5	256·0	179·2	76·8	Seriously polluted.
147	Billing's Bridge, Ont.	H.I.	16-11-14	Trace.	·19	·60	6·5	306·0	212·0	94·0	Polluted.
148	Westmeath, Ont.	R.C.Mc.	21-11-14	·75	·24	·11	11·5	292·0	172·0	120·0	Contaminated.
149	Maryfield, Sask.	G.H.P.	24-11-14	1·88	·73	·36	1,600·0	3,884·0	3,416·0	468·0	Strongly saline.
150	Saanichton, B.C.	J.M.H.	1-12-14	....	....	....	27·0	237·0	160·0	77·0	Possibly a good water.
151	Bellview, Ont.	R.R.	1-12-14	....	....	....	660·0	1,153·0	1,029·0	124·0	Slightly saline.
152	Westboro, Ont.	E.R.W.	2-12-14	·05	·105	1·14	25·0	507·0	420·0	87·0	Non-portable.
153	Greenwich, N.S.	B.L.B.	7-12-14	·04	·12	·56	11·0	83·0	33·0	50·0	Gravely suspicious.
154	Ramsayville, Ont.	R.K.	7-12-14	9·68	·25	1·42	44·0	9,155·0	8,785·0	370·0	Strongly saline.
155	Quyon, Ont.	W.H.M.	11-12-14	·10	·18	·20	6·6	250·0	180·0	70·0	Suspicious.
156	Ridgemont, Ont.	P.F.	11-12-14	·02	·70	1·51	214·0	698·0	588·0	110·0	Seriously polluted.
157	Naseby, Sask.	A.A.	21-12-14	....	....	....	80·0	5,010·0	4,415·0	595·0	Strongly saline.
158	Grant, Ont.	J.Mc.	28-12-14	2·45	·40	11·43	170·0	2,257·0	1,797·0	460·0	Gravely suspicious.
159	Sidney, B.C.	E.F.	29-12-14	Free.	Free.	1·66	7·5	145·0	99·0	46·0	Suspicious.
160	Sutherland, Sask.	S.N.S.	21-12-14	2·80	·19	3·69	160·0	2,903·0	2,496·0	407·0	Slightly saline.

161	Sidney, B.C.	E.F.	29-12-14	Free.	Free.	·99	8·0	125·0	83·0	42·0	Excellent.
162	Trois Sammons, Que.	A.E.A.	31-12-14	·02	1·80	1·24	8·1	372·0	197·0	175·0	Contaminated.
163	C. E. F., Ottawa	....	8-1-15	Free.	·01	·9	9·0	350·0	301·0	49·0	Pure and wholesome.
164	Meyronne, Sask.	A.R.C.	9-1-15	·65	·18	·69	19·0	2,047·0	1,824·0	223·0	Distinctly saline.
165	Sussex, N.B.	J.W.	18-1-15	Trace.	Free.	2·79	4·6	145·0	43·0	102·0	Free from pollution.
166	St. John, N.B.	F.A.G.	18-1-15	·66	Trace.	·06	4·0	157·0	115·0	42·0	Suspicious.
167	Pt. Dover, Ont.	H.M.	25-1-15	·56	·10	Trace.	1·5	338·0	124·0	214·0	Non-potable.
168	C. E. F., Ottawa	....	6-2-15	·02	Trace.	1·03	9·7	310·0	292·0	18·0	Pure and wholesome.
169	Waltham, Que.	C.B.D.	2-2-15	·37	·13	·04	2·0	36·0	30·0	6·0	Probably pure.
170	Bresaylor, Sask.	A.Mc.	4-2-15	....	....	....	7·3	1,673·0	1,340·0	333·0	Saline.
171	Russell, Ont.	A.A.R.	8-2-15	....	....	....	4,260·0	7,458·0	7,048·0	410·0	Strongly saline.
172	Fredericton, N.B.	J.S.A.	7-2-15	·47	·17	....	1·1	46·0	25·0	21·0	Suspicious.
173	Pinkham, Sask.	A.B.	19-2-15	·08	·35	·08	10·2	6·000·0	5,173·0	827·0	Strongly saline.
174	Pinkham, Sask.	A.B.	19-2-15	4·84	·16	....	12·2	1,560·0	1,354·0	206·0	Slightly saline.
175	Westboro, Ont.	N.S.Mc.	20-2-15	·03	·03	10·47	35·2	938·0	440·0	498·0	Gravely suspicious.
176	Cap Rouge, Que.	G.A.L.	20-2-15	·08	·22	·53	6·6	388·0	299·0	89·0	Suspicious.
177	Foam Lake, Sask.	F.T.S.	26-2-15	....	....	....	189·0	18,520·0	13,888·0	4·632·0	Strongly saline.
178	Quill Lake, Sask.	H.S.P.	1-3-15	·28	·09	·69	6·6	1,454·0	1,166·0	288·0	Saline.
179	Wilkie, Sask.	W.A.J.	3-3-15	·07	·295	·008	Trace.	246·0	148·0	98·0	Free from contamination
180	Mantario, Sask.	D.Mc.	12-3-15	·30	·29	·21	14·0	1,828·0	1,504·0	324·0	Saline.
181	Nepean	C.E.F.	16-3-15	·15	·04	·54	10·1	352·0	253·0	99·0	Pure and wholesome.
182	Masset, B.C.	J.M.	16-3-15	....	....	....	27·6	150·0	72·0	78·0	Possibly good water.
183	Ottawa, Ont.	R.O.G.C	17-3-15	·09	·06	1·45	2·6	78·0	36·0	42·0	Polluted.
184	Duncans, B.C.	W.V.	20-3-15	·04	·09	·032	5·2	130·0	126·0	4·0	Free from pollution.
185	Duncans, B.C.	W.V.	20-3-15	Trace.	·26	·032	10·2	76·0	69·0	7·0	Free from pollution.
186	Seven Persons, Alta.	D.M.	22-3-15	2·03	·09	·19	45·4	4,834·0	4,100·0	734·0	Strongly saline.
187	Outram, Sask.	J.T.T.	24-3-15	2·00	·18	·15	54·0	4,218·0	3,704·0	514·0	Strongly saline.
188	Lennoxville, Que.	B.C.	25-3-15	·04	·05	·71	1·0	66·0	16·0	50·0	Excellent.
189	Cabri, Sask.	C.H.L.	25-3-15	2·19	·155	Free.	515·7	3,558·0	2,973·0	585·0	Strongly saline.
190	Billing's Bridge, Ont.	H.D.	25-3-15	·28	·30	6·30	48·6	636·0	500·0	136·0	Seriously polluted.
191	Billing's Bridge, Ont.	H.D.	25-3-15	2·25	·59	12·47	62·6	796·0	497·0	299·0	Seriously polluted.
192	Billing's Bridge, Ont.	J.D.	25-3-15	1·70	·48	·214	20·0	422·0	316·0	106·0	Seriously polluted.
193	Grandview, Man.	W.M.	26-3-15	1·96	·18	·80	407·8	4,366·0	3,274·0	1,092·0	Strongly saline.
194	Fredericton, N.B.	J.W.Mc.	31-3-15	·18	·11	Free.	·8	76·0	29·0	47·0	Free from pollution.
195	Quesnel, B.C.	C.W.	15-2-15	·16	·10	....	6·1	620·0	420·0	200·0	Suspicious.

DOMINION EXPERIMENTAL FARMS

DEPARTMENT OF AGRICULTURE.

DOMINION OF CANADA

REPORT

FROM THE

DIVISION OF FIELD HUSBANDRY

FOR THE YEAR ENDING MARCH 31, 1915.

PREPARED BY

Acting Assistant Dominion Field Husbandman, Central Farm	W. L. Graham, B.S.A.
Superintendent—	
Experimental Station, Charlottetown, P.E.I.	J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S.	W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S.	W. Saxby Blair.
Experimental Station, Fredericton, N.B.	W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière, Qué.	Jos. Bégin.
Experimental Station, Cap Rouge, Que.	G. A. Langelier.
Experimental Farm, Brandon, Man.	W. C. McKillican, B.S.A.
Experimental Farm, Indian Head, Sask.	K. McBean, B.S.A.
Experimental Station, Rosthern, Sask.	Wm. A. Munro, B.A., B.S.A.
Experimental Station, Scott, Sask.	M. J. Tinline, B.S.A. (Acting).
Experimental Station, Lethbridge, Alta.	W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta.	G. H. Hutton, B.S.A.
Experimental Station, Invermere, B.C.	G. E. Parham.
Experimental Farm, Agassiz, B.C.	P. H. Moore, B.S.A.
Experimental Station, Sidney, B.C.	S. Spencer, Foreman-Manager.

REPORT

FROM THE

DIVISION OF FIELD HUSBANDRY

CENTRAL EXPERIMENTAL FARM

OTTAWA, March 31, 1915.

J. H. GRISDALE, Esq., B. Agr.,
Director of Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports of the work in Field Husbandry at the Central Experimental Farm and the branch Farms and Stations during the year 1914.

The work of this Division is of a practical character, and the experiments and investigations may be briefly outlined as follows:—

1. Investigation of the relative merits of different crop rotations, including special rotations for "dry farming" conditions.
2. Studies in the methods of culture of, and curing, field crops. A series of cultural experiments adapted to prairie conditions has now been under way four years on each of the six prairie Farms. These tests involve approximately five hundred plots on each Farm, and include twelve different lines of investigation.
3. Determination of the costs of growing field crops under regular farm conditions.
4. Experiments to show the value of underdrainage and irrigation.
5. Studies of the influence of size and character of cultural implements on cost of crop production.
6. Comparisons (in a limited way) of various grains and forage crops as food producers.

As explained in the report of 1914, the comparatively small number of field experiments conducted at the Central Experimental Farm is due to the present lack of sufficient land suitable for such purposes, and until suitable land is made available it will be impossible for the Division to do the most efficient service for the agriculture of the district it represents.

I have the honour to be, sir,
Your obedient servant,

W. L. GRAHAM,
Acting Assistant Dominion Field Husbandman.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

REPORT OF THE ACTING ASST. FIELD HUSBANDMAN, W. L. GRAHAM, B.S.A.

WEATHER CONDITIONS AND CROP NOTES, 1914.

The fore part of the season 1914 was unfavourable for crops. Meadows were badly winter-killed, and spring seeding commenced later than the average date for the past eleven years. Mangels and corn were sown during the last week of May and the first week of June, but the seed germinated slowly and unevenly on account of the drought. The growth of hay was also checked, yielding an average of 2 tons per acre. Straw was short but oats filled well, and on this Farm yielded 65 bushels per acre. The month of September was fine, with no damaging frosts, and corn made remarkable growth until harvested during the latter part of the month, yielding 14½ tons per acre. Roots also grew well and yielded nearly up to the average for the Farm. The autumn continued fine, and ploughing was practically finished by November 10.

The following record regarding field operations and the weather may be of interest:—

First date of sowing field grain, 1914..	April 25.
First date of sowing field grain, average of eleven years.. ..	April 23.
Earliest date of sowing field grain, 1903 to 1914..	April 10 (1910).
Latest date of commencing seeding field grain, 1903 to 1914..	May 4 (1904).
First date of sowing mangels, 1914..	May 8.
Date of sowing potatoes, 1914..	May 27.
First date of sowing corn, 1914..	May 22.
Date of commencing hay harvest, 1914..	July 2.
Date of commencing grain harvest, 1914..	August 6.
Date of commencing corn cutting, 1914..	September 15.
Date of harvesting mangels, 1914..	October 15.
Date of last ploughing, 1914..	November 10.

SOME Weather Observations taken at Central Experimental Farm, Ottawa, 1914.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Mean.	Highest.	Lowest.	Rain-fall.	Snow-fall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	11·46	41·0	−30·0	0·64	30·50	3·68	0·90	98·6
February	6·13	42·0	−30·2	....	11·00	1·10	0·55	188·0
March	25·15	48·0	−2·0	0·40	9·75	1·36	0·40	150·3
April	38·74	70·0	13·0	2·04	4·00	2·47	0·77	181·0
May	59·50	92·8	31·0	0·30	....	0·30	0·16	275·1
June	63·13	91·0	38·0	2·21	....	2·21	0·65	270·2
July	68·75	92·0	44·2	1·41	....	1·41	0·54	295·7
August	65·55	90·0	41·0	2·38	....	2·38	0·60	233·7
September	58·11	92·0	30·0	2·09	....	2·09	0·61	224·8
October	49·17	77·0	22·0	1·85	S.	1·85	0·46	143·5
November	30·29	64·6	−2·2	1·70	17·75	3·50	1·18	76·9
December	16·88	45·6	−25·0	0·66	18·00	2·46	0·80	91·5
Total for year				15·68	91·00	24·81		
Average for twelve years				....	....	32·58		
Total for six growing months April to September				....	....	10·86		
Average of twelve years for six growing months April to September				....	....	16·88		

FIELD CROP YIELDS.

The following table includes the yields of field crops at the Central Farm in 1914. They are slightly better than those of last season, but are still below the average of previous years.

YIELDS of Field Crops, Central Farm, 1914.

Crop.	Area.	Total yield.				Average yield per acre.			
	Acres.	Tons.	Lb.	Bush.	Lb.	Tons	Lb.	Bush.	Lb.
Oats	40·00	....	....	2,600	....	....	....	65	....
Oat straw	40·00	41	1,520	....	....	1	88	....	....
Corn	32·00	464	....	....	....	14	1,000	....	....
Roots	4·00	68	....	2,260	40	17	....	565	10
Potatoes	4·00	44	1,597	1,493	17	11	399	373	18
Hay	28·00	56	....	....	....	2	....	....	....

OTTAWA.

COST OF PRODUCTION OF FIELD CROPS.

The cost of production per unit is high, as the yields in 1914 were comparatively low. Figures are given herewith for mangels, corn, oats, and hay grown in field lots.

COST OF PRODUCTION OF MANGELS.

Four acres of mangels were grown in a three-year rotation of mangels, grain, clover hay. The clover sod was ploughed shallow early in August, top worked and ribbed up in late autumn, in part preparation for the mangels.

Number of acres, 4.	
Rent of land at $3 per acre	$12 00
Use of machinery at 60 cents per acre	2 40
Third share of manure, at rate of 18 tons per acre, at $1 per ton	24 00
Ploughing in autumn 16 hours 4-horse team at 48 cents	7 68
Discing in autumn 12 hours 4-horse team at 48 cents	5 76
Ribbing in autumn 4 hours 2-horse team at 34 cents	1 36
Discing in spring, 6 hours 4-horse team at 48 cents	2 88
Discing, 8 hours, 3-horse team at 41 cents	3 28
Harrowing 2 hours 2-horse team at 34 cents	68
Rolling 4 hours 2-horse team at 34 cents	1 36
Drilling 8 hours 2-horse team at 34 cents	2 72
Seed 40 pounds at 25 cents	10 00
Sowing 24 hours manual labour at 17 cents	4 08
Hoeing 120 hours manual labour at 17 cents	20 40
Cultivating 15 hours 2-horse team at 34 cents	5 10
Cultivating 8 hours single horse at 27 cents	2 16
Pulling, loading and unloading 208 hours manual labour at 17 cents	35 36
Hauling, 26 hours 2-horse team at 34 cents	8 84
Total cost for 4 acres	$ 150 06
Cost per acre	37 52
Yield per acre . . bush.	565
Yield per acre . . tons.	17
Cost per bushel . . cents.	6·64
Cost per ton . . $	2 21

COST OF PRODUCTION OF ENSILAGE CORN.

Thirty-two acres of ensilage corn were grown in a three-year rotation of corn, grain, clover hay. The land was manured at the rate of 18 tons per acre and spring ploughed, turning under the manure and the growth of clover.

Number of acres, 32—	
Rent of land at $3 per acre	$ 96 00
Use of machinery at 60 cents per acre	19 20
Third share of manure at rate of 18 tons per acre, at $1 per ton	192 00
Ploughing 128 hours 3-horse team at 41 cents	52 48
Discing 45 hours 4-horse team at 48 cents	21 60
Discing 12 hours 3-horse team at 41 cents	4 92
Seed 16 bushels at $2 per bushel	32 00
Seeding 16 hours 2-horse team at 34 cents	5 44
Rolling 16 hours 2-horse team at 34 cents	5 44
Cultivating three times 108 hours 2-horse team at 34 cents	36 72
Cultivating 64 hours single horse at 27 cents	17 28
Hoeing 256 hours manual labour at 17 cents	43 52
Cutting 53 hours 3-horse team at 41 cents	21 73
Hauling 154 hours 2-horse team at 34 cents	52 36
Loading, unloading, tramping, etc., 216 hours manual labour at 17 cents	36 72
Man at engine 54 hours manual labour at 17 cents	9 18
Twine 160 pounds at 13 cents	20 80
Total cost for 32 acres	$ 667 39
Cost per acre	20 85
Yield per acre . . tons.	14·5
Cost per ton . . $	1 44

COST OF PRODUCTION OF OATS.

Forty acres of oats were grown in a three-year rotation of corn, oats, clover hay. The corn ground was ploughed in the autumn, and with the oats was seeded a heavy mixture of timothy and clover.

Number of acres, 40—		
Rent of land at $3 per acre	$	120 00
Use of machinery at 60 cents per acre		24 00
Third share of manure, at rate of 18 tons per acre at $1 per ton		240 00
Ploughing in autumn, 104 hours 3-horse team at 41 cents		42 64
Discing in autumn, 26 hours 4-horse team at 48 cents		12 48
Discing 48 hours 4-horse team at 48 cents		23 04
Discing 22 hours 3-horse team at 41 cents		9 02
Harrowing 20 hours 2-horse team at 34 cents		6 80
Seeding 21 hours 3-horse team at 41 cents		8 61
Rolling 18 hours 2-horse team at 34 cents		6 12
Cutting 27 hours 3-horse team at 41 cents		11 07
Twine 120 pounds at 13 cents		15 60
Stooking 55 hours manual labour at 17 cents		9 35
Hauling 42 hours 2-horse team at 27 cents		11 34
Loading and unloading 90 hours manual labour at 17 cents		15 30
Threshing 2,602 bushels at 1⅝ cents per bushel		43 37
Total cost for 40 acres	$	598 74
Cost per acre		14 97
Yield of grain per acre	bush.	65
Yield of straw per acre	tons.	1·04
Cost per bushel of grain (grain valued at 34 cents per bushel and straw at $4 per ton)	cents.	19·39
Cost per ton of straw	$	2 27

NOTE.—The relative costs of grain and straw are estimated in the following manner.

Total revenue per acre from grain and straw is (65 bushels at 34 cents) + (1·04 tons at $4.) = $26.26.

When revenue is $26.26 cost to produce is $14.97.

When revenue (from 65 bushels grain) is $22.10 cost to produce per bushel is

$$\frac{\$22.10 \times 14.97}{\$26.26 \times 65} = 19 \cdot 39 \text{ cents.}$$

When revenue (from 1·04 tons straw) is $4.16, cost to produce per ton is

$$\frac{4 \cdot 16 \times 14 \cdot 97}{26 \cdot 26 \times 1 \cdot 04} = \$2.27.$$

COST OF PRODUCTION OF HAY.

Twenty-eight acres of hay were grown in a three-year rotation of corn, oats, clover hay. The yield was low on account of the stand being badly winter-killed. Also the excessive drought during the growing season checked its growth. Consequently, the cost of production per ton is comparatively high.

Number of acres, 28—		
Rent of land at $3 per acre	$	84 00
Use of machinery at 60 cents per acre		16 80
Third share of manure, at rate of 18 tons per acre, at $1 per ton		168 00
Seed:—10 pounds red clover at 20 cents; 2 pounds alsike at 21 cents; 6 pounds alfalfa at 16 cents; 6 pounds timothy at 8½ cents		108 92
Cutting 39 hours 2-horse team at 34 cents		13 26
Raking 9 hours 2-horse team at 34 cents		3 06
Raking 10½ hours single horse at 27 cents		2 84
Hauling 47½ hours 2-horse team at 34 cents		16 15
Loading and unloading 120 hours manual labour at 17 cents		20 40
Coiling 44 hours manual labour at 17 cents		7 48
Total cost for 28 acres	$	440 91
Cost per acre		15 75
Yield per acre	tons.	2
Cost per ton	$	7 87

OTTAWA.

In the following table is summarized the cost of production of mangels, corn, oats and hay as given in detail preceding.

Cost of Production of Field Crops, Central Farm, 1914.

Crop.	Area.	Yield per acre.		Cost to produce.		
				Per acre.	Per ton.	Per bushel.
	Acres.	Tons.	Bush.	$ c.	$ c.	Cents.
Mangels	4·00	17	5C5	37 52	2 21	6·64
Ensilage corn	32·C0	14·5	....	20 85	1 44	....
Oats	40·00	....	65	14 97	....	19·39
Oat straw	40·00	1·C4	....	....	....	....
Hay	28·00	2	....	15 75	7 87	....

ROTATION OF CROPS.

The line of farming engaged in will determine to a great extent the kinds and relative amounts of crops that will be grown. For this reason it is impossible to outline, definitely, a rotation that would be most suitable and profitable for all. However, it may be stated that a good rotation includes hoed, cereal and meadow or pasture crops which, for best results, should rotate in the order named.

Experiments have been conducted for the past eleven years to determine the relative value of different rotations. The results are distinctly in favour of the systematic rotation of crops whereby the soil is left in the best possible condition to receive the crop following.

The reasons why farmers should follow a rotation rather than continue the practice of haphazard cropping are many. The following are a few of the benefits resulting from crop rotation:—

1. The general appearance of a farm is improved where each crop is confined to one large area.
2. Every field receives at regular intervals its fair share of manure and cultural treatment, therefore the whole farm is in a condition to ensure maximum yields.
3. Cost is lessened by the saving of time due to all work of a kind being in one field.
4. Fewer fences are required, which reduces expenses.
5. Larger machinery can be utilized more economically where fields are larger and fewer.
6. More live stock can be kept, which makes more manure available.
7. Profits and yields are increased.
8. The farmer is not dependent upon a single crop.
9. It permits of the more even distribution of labour throughout the season.

The following rotations have been planned to meet the demands of the live stock farmer in Eastern Ontario and Quebec. Any of these should prove satisfactory where all operations, including soil treatment, are well performed. It is only when all factors are considered and each given its due share of attention that success will be attained.

ROTATION "A" (FIVE YEARS' DURATION).

First year.—Hoed crops. When corn is the hoed crop used, manure is applied in spring at the rate of 15 tons per acre and shallow ploughed shortly before planting time, turning under clover and manure. After the hoed crop is harvested, land is shallow ploughed or cultivated.

Second year.—Grain. Seeded down with 8 pounds of red clover, 2 pounds alsike and 10 pounds timothy per acre.

Third year.—Clover hay. Two crops expected. Top-dressed in fall with manure at rate of 15 tons per acre.

Fourth year.—Timothy hay. Field ploughed in August, top-worked and ribbed up in October.

Fifth year.—Grain. Seeded down with 10 pounds red clover, which is allowed to grow to be turned under following spring, when the hoed crop is corn.

This rotation supplies a relatively larger proportion of grain to roots and hay than the ordinary three- or four-year rotation; it would therefore be preferable where considerable grain is required. One-fifth of the land is in hoed crop, two-fifths in grain, one-fifth in clover hay, and one-fifth in timothy hay or pasture.

It has given good results here. Crop yields have been maintained and weeds have been kept in fair control.

ROTATION "B" (FIVE YEARS' DURATION).

First year.—Hoed crop. When corn is the hoed crop used, manure is applied in spring at rate of 15 tons per acre, and shallow ploughed shortly before planting time, turning under both clover and manure.

Second year.—Grain. Seeded down with 10 pounds of red clover, 2 pounds alsike and 5 pounds timothy per acre, manured at rate of 15 tons per acre.

Third year.—Hay. Ploughed late fall.

Fourth year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 5 pounds timothy per acre.

Fifth year.—Clover hay.

This rotation has maintained crop yields, and has given profits equal to "A" in the tests so far conducted, but does not answer requirements where timothy hay is called for. It can, however, be easily extended to include timothy by allowing of two years hay instead of one. This would extend the duration of the rotation from five to seven years, and the crops would succeed each other as follows: Hoed crop, grain, seeded down with clover and timothy; clover hay; timothy hay or pasture; grain, seeded down with clover and timothy; clover hay; timothy hay or pasture.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Hoed crop.

Second year.—Grain. Seeded down with 10 pounds red clover and 12 pounds timothy per acre.

Third year.—Clover hay.

OTTAWA.

Fourth year.—Timothy hay. Field ploughed in August. Manured at rate of 24 tons per acre, worked at intervals and ridged up in late fall in preparation for hoed crops.

The only objection to this rotation is that it supplies a smaller proportion of grain than is often desired. However, where live stock is kept, this point is of minor importance. It has given satisfactory results here.

ROTATION "D" (THREE YEARS' DURATION).

First year.—Hoed crop. For corn, manure is applied in spring at rate of 18 tons per acre, and shallow ploughed shortly before corn planting time, turning under both clover and manure. For roots, land should be ploughed previous fall.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike, 6 pounds alfalfa and 6 pounds timothy per acre.

Third year.—Clover hay.

This rotation is suitable where dairying or stock raising is carried on, and where there is considerable rough land for pasture. It is suitable for heavy rather than light soils.

ROTATION "R" (THREE YEARS' DURATION).

First year.—Corn. Manure applied in spring at rate of 18 tons per acre. Shallow ploughed shortly before corn planting time, turning under both clover and manure.

Second year.—Peas and oats mixed. Cut green for cattle. Seeded down with 10 pounds red clover, 2 pounds alsike, 6 pounds alfalfa and 6 pounds timothy per acre.

Third year.—Clover hay. Cut green for cattle.

Three years' records only have been kept. This rotation is designed to supply soiling crops.

The following is a summary of the characteristics common to all the rotations outlined above:—

1. Grain fields are always seeded down with clover, even though it be used only as a fertilizer, as in the case of the fifth year of rotation "A."
2. Grass and clover seedings are heavy. Increased crops of hay and rare failures of a catch have justified this practice.
3. Hoed crops form a large proportion of every rotation. An attempt to farm a small area without a hoed crop was not successful. Weeds could not readily be kept in check.
4. No field is left in hay for more than two successive years. Our records show that the second crop almost always costs more per ton than the first, and that succeeding crops are very liable to be grown at a loss.
5. Barnyard manure is applied frequently in comparatively small quantities, rather than at long intervals in large quantities.

To determine the net profits (profits after deducting cost of rent, all manual and horse labour, manure, seed, twine and use of machinery) as well as the value of yields of these rotations, careful records have been kept of all items chargeable against the rotations.

OTTAWA.

The following fixed values are being used in this and similar work on all the eastern farms and stations:—

COST VALUES.

Manual labour	$ 0 17	per hour.
Horse labour, including teamster—		
Single horse	27	"
2-horse team	34	"
3-horse team	41	"
4-horse team	48	"
Additional horses each	7	"
Rent	3 00	per acre.
Machinery (inclusive of threshing machinery)	60	"
Barnyard manure (spread)	1 00	per ton.
Commercial fertilizers charged at cost		
Seed wheat, oats, barley, buckwheat and rye	1 00	per acre.
Seed peas	2 00	"

Turnip, mangel, potato and corn seed charged at cost.

Grass and clover seed charged at cost, total cost to be distributed over the number of years in hay and pasture.

Twine charged at cost.

Threshing charged according to actual labour expended, the items charged under this head to include only such operations as begin after the load of grain arrives at the feed table, or after the grain is stacked or placed in the mow ready to be thrown on the feed table. Loading, hauling, etc., to be charged to manual and horse labour.

RETURN VALUES.

Wheat, oats, barley, rye and buckwheat		$ 0 01	per pound.
Peas		1¼	"
Hay (timothy, clover, alfalfa or mixed)		7 00	per ton.
Straw (wheat, oat, barley, rye, buckwheat or peas)		4 00	"
Corn ensilage		2 00	"
Sugar beets		3 00	"
Forage crops (green)		2 00	"
Turnips, carrots, mangels		2 00	"
Potatoes		50	per bushel.
Pasture—			
Horses	per head.	1 00	per month.
Cattle	"	1 00	"
Sheep	"	25	"

The items for which there are no fixed charges have been valued as follows:—

Twine	$ 0 13	per pound.
Red clover	20 00	per 100 lbs.
Alsike clover	21 00	"
Alfalfa	16 00	"
Timothy	8 50	"
Seed corn	1 50	per bushel.
Mangel seed	20	per pound.
Turnip seed	25	"

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The returns for 1914 are low as compared with the average for preceding years. This was due largely to the season which, during the early part, was especially unfavourable to crops. These rotations were rearranged in 1912, and averages are therefore drawn for a period of eight years ending 1911.

Costs, Returns and Net Profits or Losses of Rotations "A," "B," "C," "D" and "R."

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profits or losses per acre 1914.	Profit average of 8 years. 1904–11.
	$ c.	$ c.	$ c.	$ c.
A (five years' duration)	17 21	18 14	0 93	8 78
B " " ")	17 13	18 63	1 50	9 03
C (four " ")	16 83	15 62	−1 21	8 15
D (three ")	18 83	18 17	−0 66	10 08[1]
R (three ")	18 76	19 49	0 73	....

[1] Records kept for two years only.

The following tables contain details in

ROTATION "A"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and Manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Oats...........	Corn...........	1	9 40	1 87	42	7 14	1½	12½	5½	2½	......
2nd..	Hay...........	Oats...........	1	9 40	1 92	3	0 51	½	1½	5¼	1½	......
3rd...	Hay...........	Hay...........	1	9 40	2 04	6	1 02	½	2½	......	......	......
4th..	Oats...........	Hay...........	1	9 40	2 04	6	1 02	½	2½	......	......	......
5th..	Corn...........	Oats...........	1	9 40	1 86	3	0 51	½	1½	5¼	1½	......
	Aggregate........................		5	47 00	9 73	60	10 20	3½	20½	16	5½	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

ROTATION "B"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and Manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st...	Hay...........	Corn...........	1	9 00	1 87	38	6 46	1½	10½	5½	2½	......
2nd..	Corn...........	Oats...........	1	9 00	1 93	3	0 51	½	1½	5¼	1½	......
3rd..	Oats...........	Hay...........	1	9 00	3 45	6	1 02	½	2½	......	......	......
4th..	Hay...........	Oats...........	1	9 00	1 93	2½	0 43	½	2	5¼	1½	......
5th..	Oats...........	Hay...........	1	9 00	3 45	5	0 85	½	2½	......	......	......
	Aggregate........................		5	45 00	12 63	54½	9 27	3½	19	16	5½	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

ROTATION "C"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and Manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st...	Hay...........	Corn...........	1	9 00	1 87	41	6 97	1½	11½	5½	2½	......
2nd..	Corn...........	Oats...........	1	9 00	1 93	3	0 51	½	1½	5¼	1½	......
3rd..	Oats...........	Hay...........	1	9 00	2 11	5	0 85	½	2½	......	......	......
4th..	Hay...........	Hay...........	1	9 00	2 11	4½	0 77	½	2½	......	......	......
	Aggregate........................		4	36 00	8 02	53½	9 10	3	18	10¾	4	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

ROTATION "D"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and Manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st...	Hay...........	Corn...........	1	9 00	1 87	40	6 80	1½	11½	5½	2½	......
2nd..	Corn...........	Oats...........	1	9 00	1 93	2¼	0 39	½	1½	5¼	1½	......
3rd..	Oats...........	Hay...........	1	9 00	4 49	5	0 85	½	2½	......	......	......
	Aggregate........................		3	27 00	8 29	47¼	8 04	2½	15½	10¾	4	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

ROTATION "R"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and Manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st...	Hay...........	Corn...........	1·6	14 40	2 99	50	8 50	2½	15¼	8½	3¾	......
2nd..	Corn...........	Peas and oats..	1·6	14 40	3 41	20	3 40	2	10	6¼	2	......
3rd..	Peas and oats..	Hay...........	1·6	14 40	7 18	6½	1 11	1	4	......	......	......
	Aggregate........................		4·8	43 20	13 58	76½	13 01	5½	29¼	14¾	5¾	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

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connection with the rotations in 1914:—

(five years' duration).

In raising Crop.						Particulars of Crop.						
						Weight.						
Cost of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Grain.	Straw.	Hay.	Roots, ensilage or green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Lb.	Lb.	Lb.	Lb	$ c.	$ c.	$ c.
8 10	......	26 51	26 51	......	2 12	....	....	....	25,050	25 05	25 05	−1 46
3 52	1 13	16 48	16 48	24·9	......	2,252	1,918	....	....	26 36	26 36	9 88
0 99	......	13 45	13 45	......	10 67	....	....	2,530	....	8 86	8 86	−4 59
0 99	......	13 45	13 45	......	11 79	....	....	2,280	....	7 98	7 98	−5 47
3 52	0 88	16 17	16 17	31·3	......	1,754	2,436	....	....	22 42	22 42	6 25
17 12	2 01	86 06	......	......	......	....	....	....	....	90 67	....	....
....	......	......	17 21	......	......	....	....	....	....	....	18 14	0 93
(five years' duration).												
7 43	......	24 76	24 76	......	2 45	....	....	....	20,200	20 20	20 20	−4 56
3 52	1 06	16 02	16 02	25·6	......	2,126	1,544	....	....	24 35	24 35	8 33
0 99	......	14 46	14 46	......	6 34	....	....	4,560	....	15 96	15 96	1 50
3 69	1 08	16 13	16 13	25·5	......	2,150	1,720	....	....	24 94	24 94	8 81
0 99	0 10	14 29	14 29	......	12 99	....	....	2,200	....	7 70	7 70	−6 59
16 62	2 14	85 66	......	......	......	....	....	....	....	93 15	....	....
....	......	......	17 13	......	......	....	....	....	....	....	18 63	1 50
(four years' duration).												
7 77	......	25 61	25 61	......	2 51	....	....	....	20,400	20 40	20 40	−5 21
3 52	0 92	15 88	15 88	29·3	......	1,840	2,280	....	....	22 96	22 96	7 08
0 99	......	12 95	12 95	......	9 05	....	....	2,860	....	10 01	10 01	−2 94
0 99	......	12 87	12 87	......	9 90	....	....	2,600	....	9 10	9 10	−3 77
13 27	0 92	67 31	......	......	......	....	....	....	....	62 47	....	....
....	......	......	16 83	......	......	....	....	....	....	....	15 62	−1 21
(three years duration).												
7 77	......	25 44	25 44	......	2 54	....	....	....	20,000	20 00	20 00	−5 44
3 52	0 87	15 71	15 71	30·9	......	1,728	1,822	....	....	20 92	20 92	5 21
0 99	......	15 33	15 33	......	7 90	....	....	3,880	....	13 58	13 58	−1 75
12 28	0 87	56 48	......	......	......	....	....	....	....	54 50	....	....
....	......	......	18 83	......	......	....	....	....	....	....	18 17	−0 66
(three years' duration).												
11 15	......	37 04	23 15	......	1 78	....	....	....	41,580	41 58	25 99	2 84
7 46	......	28 67	17 92	......	1 73	....	....	....	33,200	33 20	20 75	2 83
1 63	......	24 32	15 20	......	9 07	....	....	5,360	....	18 76	11 73	−3 47
20 24	......	90 03	......	......	......	....	....	....	....	93 54	....	....
....	......	......	18 76	......	......	....	....	....	....	....	19 49	0 73

OTTAWA.

SHALLOW PLOUGHING AND SUBSOILING *versus* DEEP PLOUGHING.

This experiment has been under way for the past eleven years and the average returns for the period of ten years show a slight advantage in favour of the deep ploughing. The results of the experiment for the past season are also in favour of the deep ploughing. There must, however, be taken into consideration the fact that where subsoiling is practised, a single plough must be used whereas a two-furrow plough may be operated under the deep-ploughing method. The cost of operation is higher in the former method, which reduces somewhat the net profits.

Two four-year rotations differing only in the treatment of the sod land in preparation for corn or roots, were laid down in 1904.

ROTATION "S" (SHALLOW PLOUGHING AND SUBSOILING).

First year.—Corn or roots. Field manured at rate of 24 tons per acre. Ploughed out of sod previous August, 4 inches deep, subsoiled to a depth of 8 or 9 inches, and ridged up in late autumn. The land is ploughed shallow or cultivated in preparation for the grain which follows.

Second year.—Grain. Seeded down with 10 pounds red clover and 12 pounds timothy per acre.

Third year.—Clover hay. Cut twice in the season.

Fourth year.—Timothy hay. Broken in August and prepared for corn or roots, as indicated above.

ROTATION "P" (DEEP PLOUGHING).

This rotation differs from rotation "S" only in the treatment of the timothy hayfield in preparation for corn or roots. In August, it is manured, ploughed to a depth of 7 inches, top-worked and ploughed again late fall, 7 inches deep.

COSTS, RETURNS AND NET PROFITS OF ROTATIONS "S" and "P," 1914.

Rotation.	Cost to operate per acre.	Value of returns per acre.	Profit per acre. 1914
	$ c.	$ c.	$ c.
S (shallow ploughing and subsoiling)	17 96	20 33	2 37
P (deep ploughing)	17 36	21 12	3 76

OTTAWA.

COSTS, Returns and Net Profits of Rotations "S" and "P," average of 11 years.

Year.	Cost to operate per acre.		Value of returns per acre.		Net profits per acre.	
	S	P	S	P	S	P
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1904	19 89	19 89	22 98	22 98	3 09	3 00
1905	22 88	22 89	36 74	36 89	13 86	14 00
1906	19 35	19 39	25 06	24 93	5 71	5 54
1907	20 13	20 29	27 63	27 41	7 50	7 12
1908	15 84	16 03	20 21	20 34	4 37	4 31
1909	16 65	17 05	25 64	25 80	8 99	8 75
1910	13 67	14 42	23 36	23 60	9 69	9 18
1911	14 24	14 53	26 25	26 72	12 01	12 19
1912	19 47	19 02	27 14	28 99	7 67	9 97
1913	18 13	17 52	17 71	18 34	−0 42	0 82
1914	17 96	17 36	20 33	21 12	2 37	3 76
Total	198 21	198 39	273 05	277 12	74 84	78 73
Average for 11 years	18 02	18 03	24 82	25 19	6 80	7 16

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The following table gives details of these rotations in 1914.

ROTATION "S"

Rotation Year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse labour (including teamster). Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1913.	1914.	Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Hay...........	Corn...........	1	9 00	1 87	37	6 29	1½	29	1½	3½	......
2nd..	Corn...........	Oats...........	1	9 00	1 93	3	0 51	½	1½	5¼	1½	......
3rd..	Oats...........	Hay...........	1	9 00	2 11	5	0 85	1	3	......	......	......
4th..	Hay...........	Hay...........	1	9 00	2 11	5	0 85	½	2½	......	......	......
	Aggregate........................		4	36 00	8 02	50	8 50	3½	36	6¾	5	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

ROTATION "P"

1st...	Hay...........	Corn...........	1	9 00	1 87	39	6 63	1½	12	9½	3	......
2nd..	Corn...........	Oats...........	1	9 00	1 93	3	0 51	½	1½	5¼	1½	......
3rd..	Oats...........	Hay...........	1	·9 00	2 11	5	0 85	1	3	......	......	......
4th..	Hay...........	Hay...........	1	9 00	2 11	5	0 85	½	2½	......	......	......
	Aggregate........................		4	36 00	8 02	52	8 84	3½	19	14¾	4½	......
	Average per acre, 1914..........		......	... ..	......	......	......	......	......	......	......	......

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Values as given on page 182 have been used:—

(shallow ploughing and subsoiling).

IN RAISING CROP.						PARTICULARS OF CROP.						
						Weight.						
Cost of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Grain.	Straw.	Hay.	Roots, ensilage or green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
12 56	......	29 72	29 72	......	2 16	....	....	....	27,450	27 45	27 45	−2 27
3 52	0 95	15 91	15 91	28·3	......	1,910	2,690	....	....	24 48	24 48	8 57
1 29	......	13 25	13 25	......	5 64	....	....	4,700	....	16 45	16 45	3 20
0 99	......	12 95	12 95	......	7 19	....	....	3,700	....	12 95	12 95	0 00
18 36	0 95	71 83	......	......	......	....	....	....	....	81 33	....	....
....	......	......	17 96	......	......	....	....	....	....	....	20 33	2 37

(deep ploughing).

9 83	......	27 33	27 33	......	1 91	....	....	....	28,650	28 65	28 65	1 32
3 52	0 94	15 90	15 90	29	......	1,880	2,530	....	....	23 86	23 86	7 96
1 29	......	13 25	13 25	......	5 76	....	....	4,600	....	16 10	16 10	2 85
0 99	......	12 95	12 95	......	5 70	....	....	4,535	....	15 87	15 87	2 92
15 63	0 94	69 43	......	......	......	....	....	....	....	84 48	....	....
....	......	......	17 36	......	......	....	....	....	....	....	21 12	3 76

COMMERCIAL FERTILIZERS.

In 1914 there were completed six years of experiments designed to supply information concerning the relative fertilizing merits, in regular farm rotation, of:—

(1) No manure or fertilizer of any kind, but pastured one year in four (records kept for two years only).
(2) Barnyard manure.
(3) Complete commercial fertilizer.
(4) Barnyard manure, together with commercial fertilizer.

To carry out this work, four areas of land were selected, "N" in 1912, and "X," "Y" and "Z" in 1909. Each area was divided into four equal-sized plots, and placed under the following rotation:—

First year.—Hoed crop.

Second year.—Oats. Seeded down with 8 pounds red clover, 2 pounds alsike, and 12 pounds timothy per acre.

Third year.—Clover hay.

Fourth year.—Timothy hay on rotations "X," "Y" and "Z," and pasture on rotation "N." Land ploughed shallow in early autumn, top-worked and ribbed up in late autumn.

The fertilizer treatment given these areas is shown in the following table:—

FERTILIZER Treatment Given Rotations "N," "X," "Y" and "Z."

Crop.	Rotation N.	Rotation X.	Rotation Y.	Rotation Z.
Mangels	No fertilizer	Manure 15 tons	No Manure. Superphosphate 300 lb. Muriate of Potash, 75 lb. Nitrate of Soda, 100 lb.	Manure 7½ tons. Superphosphate 150 lb. Muriate of Potash, 37½ lb. Nitrate of Soda, 50 lb.
Oats	No fertilizer	No fertilizer	Nitrate of Soda, 100 lb.	Nitrate of Soda, 100 lb.
Clover hay	No fertilizer	No fertilizer	Nitrate of Soda. 100 lb.	Nitrate of Soda, 100 lb.
Timothy hay	Pastured	No fertilizer	Nitrate of Soda. 100 lb.	Nitrate of soda, 100 lb.

The six years' results supply the following interesting data:—

Rotation "X," which was fertilized with barnyard manure alone, cost the least to operate and produced the largest returns. The average profit for the period was $7.46 per acre.

Rotation "Z," which received a mixture of barnyard manure and commercial fertilizers, produced equally as well as rotation "X," but cost slightly more to operate, with the result that the net profit was just $6.52 per acre.

Rotation "Y," receiving commercial fertilizer alone, was the lowest in producing power and cost as much to operate as "X." The profits therefrom have averaged only $5.38 per acre.

These results show a distinct advantage of barnyard manure alone over commercial fertilizer alone for this soil, but point to the possibility of combining the two to good advantage when barnyard manure is scarce or high in price.

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In calculating the returns from these rotations, fixed values as given on page 182 of this report were used. Fertilizers were valued as follows:—

Muriate of potash..	$2.50 per 100 pounds.
Nitrate of soda..	3.00 " "
Superphosphate..	0.90 " "

Costs, Returns and Profits per acre of Rotations "N," "X," "Y" and "Z."

Rotation.	Cost to operate.	Value of returns.	Net profit 1914.	Net profit average of 6 years.
	$ c.	$ c.	$ c.	$ c.
N—No manure or fertilizer of any kind..........	11 59	13 41	1 82	1 47[1]
X—Barnyard manure..........................	16 01	21 38	5 37	7 46
Y—Complete commercial fertilizer............	16 04	23 53	4 49	5 38
Z—Barnyard manure together with commercial fertilizer..........	17 21	22 45	5 24	6 52

[1]Average two years, only.

COSTS, Returns and Profits per acre of Rotations "X," "Y" and "Z," 1909-14.

Year.	Cost to operate per acre.			Value of returns per acre.			Profit per acre.		
	X	Y	Z	X	Y	Z	X	Y	Z
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
1909	13 15	15 42	14 51	19 72	20 70	20 82	6 57	5 28	6 31
1910	26 58	29 16	27 91	32 55	34 52	36 26	5 97	5 36	8 35
1911	14 86	16 70	16 16	24 90	22 84	26 88	10 04	6 14	10 72
1912	19 23	19 39	20 24	30 44	26 95	25 38	11 21	7 56	5 14
1913	16 47	16 65	17 81	22 09	20 07	21 16	5 62	3 42	3 35
1914	17 72	18 89	18 97	25 18	24 27	25 49	7 46	5 38	6 52
Total for 6 years	108 01	116 21	115 60	154 88	149 35	155 99	46 87	33 14	40 39
Average per acre for 6 years	18 00	19 37	19 27	25 81	24 89	26 00	7 81	5 52	6 73

YIELDS of Hoed Crops on Rotations "X," "Y" and "Z," 1909-14.

Year.	Area.	Rotation X.	Rotation Y.	Rotation Z.
	Acres.	Lb.	Lb.	Lb.
1909	1	26,540	28,290	26,445
1910	2	73,520	78,276	81,290
1911	1	28,160	22,730	29,970
1912	1	48,360	49,130	48, 60
1913	1	36,000	32,480	34,418
1914	1	32,360	33,090	37,160
Total yield 6 years	....	244 940	243,99	257,643
Average per acre for 6 years	....	17 tons 991 lb.	17 tons6 857 lb.	8 tons 806 lb.

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YIELDS of Oats on Rotations "X," "Y" and "Z," 1909-14.

Year.	Area.	Rotation X.		Rotation Y.		Rotation Z.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Acres.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
1909	1	1,455	2,725	1,615	2,735	1,576	2,789
1910[1]	....	....	....	....	....	....	....
1911	1	1,474	2,436	1,709	2,530	1,893	2,777
1912	1	2,492	3,238	1,421	1,909	1,035	1,945
1913	1	1,650	1,680	1,457	1,363	1,565	1,735
1914	1	1,700	1,760	1,200	1,300	1,100	1,220
Total yie'd for 5 years	....	8,771	11,839	7,402	9,837	7,169	10,466
Average per acre for 5 years	....	51 bush. 20 lb.	2,368 lb.	43 bush. 18 lb.	1,967 lb.	42 bush. 6 lb.	2,093 lb.

[1] Hoed crops grown in place of grain in 1910.

YIELDS of Hay on Rotations "X," "Y" and "Z," 1909-14.

Year.	Area.	Rotation X.	Rotation Y.	Rotation Z.
	Acres.	Lb.	Lb.	Lb.
1909	2	[illegible],240	9,405	10,157
1910	2	6,900	7,230	7,860
1911	2	14,810	13,280	15,160
1912	2	12,000	11,610	11,120
1913	2	9,290	8,710	8,890
1914	2	9,325	9,830	11,200
Total yield for 6 years	....	61,565	60,065	64,387
Average per acre for 6 years	....	2 tons 1,130 lb.	2 tons 1,005 lb.	2 tons 1,366 lb.

FERTILIZER

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour: Hours.	Manual labour: Cost.	Horse labour (including teamster). Hours: Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Pasture........	Mangels........	0·33	1 00	0 70	22	3 74	1¼	5	1¼	1¼	......
2nd..	Mangels........	Oats...........	0·33	1 00	0 61	1	0 17	¼	½	1¾	¼	......
3rd..	Oats...........	Hay...........	0·33	1 00	0 66	1¾	0 27	¼	1	......	......	......
4th..	Hay...........	Hay...........	0·33	1 00	0 46	......	......	......	......	......	......	......
	Aggregate......................		1·32	4 00	2 43	24¾	4 18	1¾	6½	3	1½	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

FERTILIZER

1st...	Hay...........	Turnips........	1	6 75	1 10	68	11 56	4	14½	4	4	......
2nd..	Mangels........	Oats...........	1	6 75	1 93	2¾	0 47	½	1½	5¼	1	......
3rd..	Oats...........	Hay...........	1	6 75	2 12	5	0 85	½	3	......	......	......
4th..	Hay...........	Hay...........	1	6 75	2 12	5	0 85	½	3	......	......	......
	Aggregate......................		4	27 00	7 27	80¾	13 73	5½	22	9¼	5	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

FERTILIZER

1st...	Hay...........	Turnips........	1	7 14	1 10	69½	11·82	4	9½	4	4	......
2nd..	Mangels........	Oats...........	1	7 14	1 93	4¼	0 72	½	1½	5¼	1	......
3rd..	Oats...........	Hay...........	1	7 14	2 12	5	0 85	½	3	......	......	......
4th..	Hay...........	Hay...........	1	7 14	2 12	5	0 85	½	3	......	......	......
	Aggregate......................		4	28 56	7 27	83¾	14 24	5½	17	9¼	5	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

FERTILIZER

1st...	Hay...........	Turnips........	1	8 07	1 10	70	11 90	4	12½	4	4	......
2nd..	Mangels........	Oats...........	1	8 07	1 93	2¾	0 47	½	1½	5¼	1	......
3rd..	Oats...........	Hay...........	1	8 07	2 12	6½	1 11	½	3	......	......	......
4th..	Hay...........	Hay...........	1	8 07	2 12	5½	0 94	½	2½	......	......	......
	Aggregate......................		4	32 28	7 27	84¾	14 42	5½	19½	9¼	5	......
	Average per acre, 1914..........		......	......	......	......	......	......	......	......	......	......

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ROTATION "N."

In raising Crop.						Particulars of Crop.						
						Weight.						
Cost of horse labour	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Grain.	Straw.	Hay.	Roots, ensilage and green feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Lb.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.
3 15	......	8 59	25 77	......	......	......	......	......	6,770	6 77	20 31	−5 46
1 08	0 20	3 06	9 18	......	......	408	512	......	......	5 10	15 30	6 12
0 41	......	2 34	7 02	......	......	......	......	1,240	......	4 34	13 02	6 00
......	......	1 46	4 38	......	......	......	......	......	......	1 67	5 01	0 63
4 64	......	15 45	46 35	......	......	......	......	......	......	17 88	53 64	......
......	......	......	11 59	......	......	......	......	......	......	......	13 41	1 82

ROTATION "X."

9 57	......	28 98	28 98	......	......	......	......	......	32,360	32 36	32 36	3 38
3 28	0 85	13 28	13 28	......	......	1,700	1,760	......	......	20 52	20 52	7 24
1 16	......	10 88	10 88	......	......	......	......	5,225	......	18 29	18 29	7 41
1 16	......	10 88	10 88	......	......	......	......	4,100	......	14 35	14 35	3 47
15 17	......	64 02	......	......	......	......	......	......	......	85 52	......	......
......	......	......	16 01	......	......	......	......	......	......	......	21 38	5 37

ROTATION "Y."

7 87	......	27 93	27 93	......	......	......	......	......	33,090	33 09	33 09	5 16
3 28	0 60	13 67	13 67	......	......	1,200	1,300	......	......	14 60	14 60	0 93
1 16	......	11 27	11 27	......	......	......	......	5,610	......	19 64	19 64	8 37
1 16	......	11 27	11 27	......	......	......	......	4,220	......	14 77	14 77	3 50
13 47	0 60	64 14	......	......	......	......	......	......	......	82 10	......	......
......	......	......	16 04	......	......	......	......	......	......	......	20 53	4 49

ROTATION "Z."

8 89	......	29 96	29 96	......	......	......	......	......	37,160	37 16	37 16	7 20
3 28	0 55	14 33	14 33	......	......	1,100	1,220	......	......	13 44	13 44	−0 86
1 16	......	12 46	12 46	......	......	......	......	6,225	......	21 79	21 79	9 33
0 99	......	12 12	12 12	......	......	......	......	4,975	......	17 41	17 41	5 29
14 32	0 55	68 84	......	......	......	......	......	......	......	89 80	......	......
......	......	......	17 21	......	......	......	......	......	......	......	22 45	5 24

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

SEASONAL NOTES.

Snow lay on the ground during the greater part of the winter of 1913-14, and in February there was a period of extremely cold weather. The spring was very late, due to a heavy snowfall on May 2 and a light one on May 11, which delayed seeding until May 18. The trees appeared green May 28. In June rain fell on seventeen days, and the nights were cool, hoar frost being reported in some parts of the province on July 1. At this Station, haying began July 15, and the first grain was cut August 20, which was probably one week before either operation became general in the province. Two periods of hot weather occurred in September, when the temperature exceeded any former records of the summer. During these hot waves the harvest was safely housed.

Some Weather Observations taken at Charlottetown Experimental Station, 1914.

Month.	Temperature F.			Precipitation.			Heaviest in 24 hours.	Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.		
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	45	−6	16·314	·73	32	3·93	1·1	79·6
February	43	−21	9·82	·08	35·5	3·63	1·9	138·3
March	44	8	28·95	1·84	15·75	3·42	1·09	128·5
April	56	8	32·66	1·33	24·5	3·78	·8	194·9
May	76	26	48·548	1·2	8·5	2·05	·64	191·4
June	79	34·5	54·741	5·32	....	5·32	2·02	247·7
July	82	37	63·201	2·84	....	2·84	·93	277·9
August	84	46	64·	2 43	....	2·43	·55	247·9
September	8	35	59·016	5·02	....	5·02	1·47	191·
October	72	26	47·823	3·57	....	3·57	·96	135·9
November	59	11	35·284	2·29	3·6	2·65	·48	96·5
December	50	−10	22·709	1·1	9·2	2·02	·38	99·9
Total for year				27·75	129·05	41·56	....	2,029·5
Average for six years				32·25	105·68	42·77	....	1,907·5
Total for six growing months, April to September				18·14	33·	21·44	....	1,350·8
Average of five years for six growing months, April to September				17·85	12·1	19·05	....	1,302·

FIELD CROP YIELDS.

The season of 1914 was favourable for grain crops and the yields included in the statement which follows are above the average of production. The grains mentioned in connection with certain rotations were grown on multiplying plots from registered grain for seed purposes.

FIELD Crop Areas and Yields, Charlottetown, 1914.

Crop.	Preceding Crop.	Acreage.	Total Yield.	Yield per acre.
Wheat, Marquis	Turnips (Rotation B)	1·	28 bush. 25 lb.	28 bush. 25 lb.
" "	" (Rotation F)	·86	16 " 9 "	18 " 47 "
" Red Fife	Potatoes (Rotation D)	1·	14 " 12 "	14 " 12 "
Oats, Banner	Mangels (Rotation A)	1·	83 " 27 "	83 " 27 "
" "	Clover Hay (Rotation B)	1·	50 " 10 "	5 " 10 "
" "	Oats, (Connolly Field)	8·	282 " 4 "	35 " 9 "
" Ligowo	Corn (Rotation G)	·4	26 " 17 "	66 " 8 "
" Daubeney	Hay (Rotation G)	·4	19 " 1 "	47 " 19 "
" O. I. Black	Corn (Rotation C)	·57	36 " 16 "	63 " 33 "
" Victory	Pasture (Haszard Field)	3·	107 " 28 "	35 " 32 "
Barley, Manchurian	Hay (Rotation A)	1·	50 " 2 "	50 " 2 "
" Gold	" (Rotation F)	·86	49 " 12 "	57 " 13 "
Potatoes	Clover Hay (Rotation D)	1·	210 " 53 "	210 " 53 "
"	Oats (Rotation G)	·4	110 " 40 "	276 " 40 "
"	Hay (Rotation C)	·57	116 " — "	203 " 30 "
Turnips	Clover Hay (Rotation B)	1·	21 tons 180 lb.	21 tons 180 lb.
"	Barley (Rotation F)	·86	19 " 315 "	22 " 522 "
Mangels	" (Rotation A)	1·	23 " 680 "	23 " 680 "
Hay	Oats (Rotation A)	1·	2 " 1,260 "	2 " 1,260 "
"	Hay (Rotation A)	1·	2 " 410 "	2 " 410 "
"	Wheat (Rotation B)	1·	1 " 1,660 "	1 " 1,660 "
"	Oats (Rotation B)	1·	– " 1,950 "	– " 1,950 "
"	Wheat (Rotation D)	1·	2 " 300 "	2 " 300 "
"	Oats (Rotation C)	·57	1 " 1,390 "	2 " 1,947 "
"	" (Rotation G)	·4	1 " 345 "	2 " 1,862 "
"	Wheat (Rotation F)	·86	1 " 205 "	1 " 564 "

COST OF PRODUCTION OF FIELD CROPS.

The following data on the cost of production of the various crops are taken from the records kept in connection with the crop rotation experiments. As previously reported, this land is not uniform, and the areas are small, so that it will require averages extending over a number of years to make the data valuable.

The values are those that have been fixed for the rotation work on all the eastern Experimental Stations. They are not always exactly in accord with this year's prices, but on the whole they accord with normal eastern conditions. These values are given on page 182 of this report.

Cost of Production of Wheat Following Turnips.

Number of acres, 1.

Preceding crops: (Rotation B) hay, oats, hay, turnips.

Rent of land at $3 per acre	$3 00
Share of manure, at rate of 22½ tons per acre, at $1 per ton	4 50
Use of machinery at 60 cents per acre	60
Seed, 1¾ bushels	1 00
Twine, 2·7 pounds at 12 cents per pound	32
Ploughing in autumn, 2½ hours, 2-horse team at 34 cents	85
Discing in spring, 1½ hours, 2-horse team at 34 cents	51
Harrowing, ½ hour, 2-horse team at 34 cents	17
Rolling, ¼ hour, 2-horse team at 34 cents	9
Sowing, ¾ hour, 2-horse team at 34 cents	25
Cutting with binder, ¾ hour, 2-horse team at 34 cents	25
Stooking, 1½ hours manual labour at 17 cents	25
Loading and unloading, 1½ hours manual labour at 17 cents	25
Hauling, 1 hour, 2-horse team at 34 cents	34
Storing, ½ hour manual labour at 17 cents	9
Threshing, 2⅔ hours manual labour at 17 cents	45
Cost per acre	$12 92

Yield of grain per acre, 1,705 pounds or 28 bushels 25 pounds.
Yield of straw per acre, 2,600 pounds or 1 ton 600 pounds.
Valuing the straw at $4 per ton, the cost to produce 1 bushel of grain was 27·1 cents.

Cost of Production of Barley after Hay.

Number of acres, 1.

Preceding crops: (Rotation A) oats, mangels, hay, hay.

Rent of land at $3 per acre	$ 3 00
Share of manure, at rate of 25 tons per acre, at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed, 2 bushels	1 00
Twine, 2 pounds at 12 cents per pound	24
Ploughing in autumn, 2½ hours, 3-horse team at 41 cents	1 03
Harrowing in autumn, 1¾ hours, 3-horse team at 41 cents	71
Discing in spring, 4½ hours, 2-horse team at 34 cents	1 53
Harrowing, 1 hour, 2-horse team at 34 cents	34
Rolling, ¼ hour, 2-horse team at 34 cents	8
Sowing, ¾ hour, 2-horse team at 34 cents	25
Cutting with binder, ¾ hour, 2-horse team at 34 cents	25
Stooking, 2 hours manual labour at 17 cents	34
Loading and unloading, 2 hours manual labour at 17 cents	34
Hauling, 1 hour, 2-horse team at 34 cents	34
Threshing, 4 hours manual labour at 17 cents	68
Cost per acre	$15 73

Yield of grain per acre, 2,402 pounds or 50 bushels 2 pounds.
Yield of straw per acre, 1,878 pounds.
Valuing the straw at $4 per ton, the cost to produce 1 bushel of grain was 24 cents.

CHARLOTTETOWN.

Cost of Production of Oats following Mangels.

Number of acres, 1.
Preceding crops: (Rotation A) hay, hay, barley, mangels.

Rent of land at $3 per acre	$ 3 00
Share of manure, at rate of 25 tons per acre, at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed, 2½ bushels	1 00
Twine, 3·2 pounds at 12 cents per pound	38
Ploughing in autumn, 2½ hours, 2-horse team at 34 cents	85
Discing in spring, 3¼ hours, 2-horse team at 34 cents	1 13
Harrowing, ¾ hours, 2-horse team at 34 cents	24
Rolling, ¼ hour, 2-horse team at 34 cents	8
Sowing, ¾ hour, 2-horse team at 34 cents	25
Cutting with binder, ¾ hour, 2-horse team at 34 cents	25
Stooking, 1½ hours manual labour at 17 cents	25
Loading and unloading, 1 hour manual labour at 17 cents	17
Hauling, 1¼ hours, 2-horse team at 34 cents	43
Threshing, 5 hours manual labour at 17 cents	85
Cost per acre	$14 48

Yield of grain per acre, 2,849 pounds or 83 bushels, 27 pounds.
Yield of straw per acre, 3,865 pounds or 1 ton, 1,865 pounds.
Valuing the straw at $4 per ton, the cost to produce 1 bushel of grain was 8 cents.

Cost of Production of Mangels after Barley.

Number of acres, 1.
Preceding crops: (Rotation A) oats, hay, hay, barley.

Rent of land at $3 per acre	$ 3 00
Share of manure, at rate of 25 tons per acre, at $1 per ton	5 00
Use of machinery at 60 cents per acre	60
Seed, 3 pounds at 50 cents per pound	1 50
Ploughing in autumn, 2 hours, 3-horse team at 41 cents	82
Discing in spring, 3½ hours, 2-horse team at 34 cents	1 19
Harrowing, 2 hours, 2-horse team at 34 cents	68
Rolling twice, ½ hour, 2-horse team at 34 cents	17
Ridging, 1½ hours, 2-horse team at 34 cents	51
Sowing, 2 hours manual labour at 17 cents	34
Singling and hoeing, 265 hours manual labour at 17 cents	45 05
Cultivating, 12 hours, 1-horse team at 27 cents	3 24
Pulling, topping, loading, 39 hours manual labour at 17 cents	6 63
Hauling, 10 hours, 3-horse team at 41 cents	4 10
Storing, 13 hours manual labour at 17 cents	2 21
Cost per acre	$75 04

Yield of roots per acre, 23 tons, 680 pounds or 778 bushels.
Cost to produce 1 ton, $3.22.
Cost to produce 1 bushel, 9·6 cents.

Cost of Production of Turnips after Hay.

Number of acres, 1.
Preceding crops: (Rotation B) wheat, hay, oats, hay.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 22½ tons per acre, at $1 per ton	4 50
Use of machinery at 60 cents per acre	60
Seed, 2 pounds at 35 cents per pound	70
Ploughing in autumn, 2½ hours, 3-horse team at 41 cents	1 02
Harrowing in autumn, 1¼ hours, 3-horse team at 41 cents	51
Discing in spring, 3 hours, 2-horse team at 34 cents	1 02
Harrowing, 1 hour, 2-horse team at 34 cents	34
Rolling twice, ½ hour, 2-horse team at 34 cents	17
Ridging, 1⅓ hours, 2-horse team at 34 cents	45
Sowing, ½ hour manual labour at 17 cents	8
Singling and hoeing, 91 hours manual labour at 17 cents	15 44
Cultivating, 1-horse team at 27 cents	2 43
Pulling, topping, loading, 32 hours manual labour at 17 cents	5 44
Hauling, 12 hours, 3-horse team at 41 cents	4 92
Storing, 11 hours manual labour at 17 cents	1 87
Cost per acre	$42 52

Yield of roots per acre, 21 tons, 180 pounds or 703 bushels.
Cost to produce 1 ton, $2.01.
Cost to produce 1 bushel, 6 cents.

CHARLOTTETOWN.

Cost of Production of Potatoes after Clover Hay.

Number of acres, 1.
Preceding crops: (Rotation D) wheat, hay.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 17⅓ tons per acre, at $1 per ton	5 77
Use of machinery at 60 cents per acre	60
Seed, 12 bushels at 50 cents per bushel	6 00
Ploughing in autumn, 3 hours, 2-horse team at 34 cents	1 02
Harrowing in autumn, 2 hours, 2-horse team at 34 cents	68
Discing in spring, 1¾ hours, 2-horse team at 34 cents	59
Harrowing, 1 hour, 2-horse team at 34 cents	34
Rolling, ⅓ hour, 2-horse team at 34 cents	12
Cutting sets, 12 hours manual labour at 17 cents	2 04
Planting, 2 hours, 2-horse team at 34 cents	68
Planting, 3 hours, manual labour at 17 cents	51
Spraying, ½ hour, 2-horse team at 34 cents	17
Hoeing, 12 hours manual labour at 17 cents	2 04
Cultivating, 6 hours, 1-horse team at 27 cents	1 62
Spray, 3 times (Bordeaux and Paris Green)	1 71
Cultivating, 3 hours, 2-horse team at 34 cents	1 02
Picking potatoes, 43 hours manual labour at 17 cents	7 31
Digging potatoes, 2 hours, 2-horse team at 34 cents	68
Hauling, 5 hours, 3-horse team at 41 cents	2 05
Storing, 20 hours manual labour at 17 cents	3 40
Cost per acre	$41 35

Yield of potatoes per acre, 6 tons, 653 pounds or 210 bushels 53 pounds.
Cost to produce 1 ton, $6.54.
Cost to produce 1 bushel, 19·6 cents.

Cost of Production of Hay after Wheat.

Number of acres: 1.
Preceding crops: (Rotation D) potatoes, wheat.

Rent of land at $3 per acre	$ 3 00
Share of manure, at rate of 17⅓ tons per acre at $1 per ton	5 77
Use of machinery at 60 cents per acre	0 60
Charges on 12 pounds of timothy at 9 cents, 8 pounds red clover at 28¼ cents, 2 pounds alsike at 32 cents	3 98
Cutting ·8 hour with 2-horse team at 34 cents	0 27
Coiling and tedding, 10½ hours manual labour at 17 cents	1 78
Raking, ¼ hour with 2-horse team at 34 cents	0 09
Loading, ½ hour with 2-horse team at 34 cents and 3 hours manual labour at 17 cents	0 6
Unloading, ¼ hour with 2-horse team at 34 cents and 1 hour manual labour at 17 cents	0 26
Cost per acre	$16 43

Yield of hay per acre 2 tons, 300 pounds.
Cost to produce 1 ton, $7.64.

Cost of Production of Hay after Oats.

Number of acres: 1.
Preceding crops: (Rotation A) hay, barley, mangels, oats.

Rent of land at $3 per acre	$ 3 00
Share of manure at rate of 25 tons per acre, at $1 per ton	5 00
Use of machinery at 60 cents per acre	0 60
Half of the charges on 12 pounds of timothy at 9 cents, 10 pounds red clover at 28 cents, 2 pounds alsike at 32 cents	2 26
Cutting, five-sixth hour with 2-horse team at 34 cents	0 28
Coiling and shaking out, 9 hours manual labour at 17 cents	1 53
Raking, ¼ hour with 2-horse team at 34 cents	0 09
Loading, ¾ hour with 2-horse team at 34 cents and 2½ hours manual labour at 17 cents	0 66
Unloading, ¼ hour with 2-horse team at 34 cents and 1 hour manual labour	0 26
Cost per acre	$13 68

Yield of hay per acre, 2 tons, 1,260 pounds.
Cost to produce 1 ton, $5.20.

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The following table gives a summary of the cost of production of wheat, oats, barley, mangels, turnips, potatoes and hay. In computing the values of the cereals the straw was valued at $4 per ton. The very high cost of the mangels per acre was due to the large amount of hand labour required to clean the land thoroughly of couch grass and other weeds with which it was infested.

Cost of Production of Field Crops, Charlottetown, P.E.I., 1914.

Crop.	Area.	Yield per acre.				Cost to Produce.		
						Per acre.	Per ton.	Per bush.
	Acres.	Tons.	Lb.	Bush.	Lb.	$ cts.	$ cts.	Cents.
Wheat	1			28	25	12 92		27·1
Oats	1			83	27	14 48		8
Barley	1			50	2	15 73		24
Mangels	1	23	680	778		75 04	3 22	9·6
Turnips	1	21	180	703		42 52	2 01	6
Potatoes	1	6	653	201	53	41 35	6 54	19·6
Hay after wheat	1	2	300			16·43	7·64	
Hay after oats	1	2	160			13 68	5·20	

ROTATION OF CROPS.

It is generally known that certain crops do better after certain other crops, but it is very important that a systematic rotation be adopted for the following reasons:—

(A) A variety of food can be provided for stock at the different seasons of the year.

(B) Noxious weeds may be controlled or eradicated from the land cheaply.

(C) Certain rotations aid in the control of plant diseases.

(D) A definite farm plan eliminates all unnecessary fences.

The following rotations, which were started in 1912, meet a number of the requirements in Prince Edward Island:—

ROTATION "A" (FIVE YEARS' DURATION).

Suitable for Dairy Farm.

First year.—Hoed crop. On a dairy farm, mangels can be grown to advantage. Part of the manure, about 12 tons per acre, can be applied either before or after the previous grain crop. Then 13 tons of manure per acre is worked into the land before it is ridged up for the mangels. After the crop is harvested the land is ridged up for the winter.

Second year.—Grain. Seeded down with 10 pounds of red clover, 2 pounds of alsike and 12 pounds of timothy per acre.

Third year.—Clover hay. After the rotation is well started the clover does not winter-kill nearly as badly as when it was sown on land that had been in hay for several years.

Fourth year.—Timothy hay or pasture. There was quite a good sprinkling of clover in this field in 1914. It was ploughed in August and top-worked during autumn.

Fifth year.—Grain. Barley has been used as this grain crop, and 8 pounds of red clover was sown with it. This not only added much valuable fertilizer to the land, but it no doubt assisted in propagating and conserving the necessary clover bacteria in the soil until the next clover crop of the rotation.

This rotation provides a large supply of roots and grain, which are essential for good live stock production. Sufficient grain can be raised so that part of it can be sold for seed purposes and concentrated meals bought at feed prices for the stock.

ROTATION "B" (FIVE YEARS' DURATION).

Similar to "A" in regard to crops grown, but devised to destroy ox-eye daisy and other persistent weeds.

First year.—Hoed crop. Turnips have been used, and produce a large quantity of succulent winter food. Spring manured at rate of 15 tons per acre.

Second year.—Grain. Seeded down with 10 pounds of red clover, 2 pounds alsike, and 6 pounds timothy per acre.

Third year.—Clover hay. Ploughed in autumn.

Fourth year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike, and 12 pounds timothy per acre, and ploughed under for roots.

This rotation produces a large quantity of clover hay and destroys weeds, with a small expenditure of labour. It can easily be extended another year or two so as to provide timothy hay or pasture.

ROTATION "C" (FOUR YEARS' DURATION).

Suitable for stock farms where quantities of hay are needed and only a sufficient quantity of grain is required for feeding purposes.

First year.—Hoed crops. Manured 20 tons per acre, part applied previous autumn.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Third year.—Clover hay.

Fourth year.—Timothy hay or pasture. Clover came well on parts of the field. A part of the manure for the roots was applied and ploughed under early in September.

ROTATION "D" (THREE YEARS' DURATION).

This rotation will supply the greatest quantity of rough forage and grain for dairy or beef cattle. It is probably the best rotation to destroy many of our worst weeds, and for this reason it could be used advantageously for a period of years on sections of the farm that have become infested with daisy, yarrow or couch grass. Pasturage for stock has to be supplied elsewhere, which does not suit Prince Edward Island conditions owing to the lack of rough pasture land, the province being almost wholly tillable.

First year.—Hoed crop. Manured 15 tons per acre.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 6 pounds of timothy.

Third year.—Clover hay. Cut before the weed seeds ripen and aftermath ploughed under early in the fall and top-worked in preparation for the hoed crop.

CHARLOTTETOWN.

ROTATION "F" (FOUR YEARS' DURATION).

This rotation was planned to meet a special need; the growing of large quantities of grain for seed purposes. The area for cereals at this Station is limited; the arrangement for this rotation was made in order to test as many varieties of grain in duplicate as possible, one-half of the total area being in grain each year. It has also been a good weed destroyer.

First year.—Hoed crop. Manured 12 tons per acre, worked in in spring.

Second year.—Grain. Wheat or barley seeded down with 10 pounds of red clover, 2 pounds of alsike and 6 pounds of timothy.

Third year.—Clover hay. Top-dressed with 8 tons manure and ploughed under in autumn.

Fourth year.—Oats. Seeded down with 8 pounds of red clover and 2 pounds of alsike.

ROTATION "G" (SEVEN YEARS' DURATION).

This is known as the "Prince Edward Island rotation," and is still most generally used in the province. It is used here to demonstrate that with four consecutive years of hay or pasture, clover does not thrive as well or persist under adverse winter conditions such as have been general for some years.

It is believed to be efficient in controlling plant diseases such as club-root of turnips and powdery scab of potatoes.

First year.—Oats. Seeded down with 8 pounds of red clover and 2 pounds of alsike.

Second year.—Hoed crops. Potatoes on the greater part of the area. Manured with twenty tons of manure.

Third year.—Wheat or barley. Seeded down with 10 pounds red clover, 2 pounds alsike and 12 pounds of timothy per acre.

Fourth year.—Hay.

Fifth year.—Hay. Top-dressed in August with 15 tons manure.

Sixth year.—Pasture.

Seventh year.—Pasture. Ploughed in August and top-worked during autumn.

We have not been able to pasture this rotation and as the meadows are only two years old, the whole area having been drained in the autumn of 1912, the hay on all the sections was heavy. This rotation will be a good one to check the others up with in future.

Fixed cost and return values given on page 182 of this report are being used.

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ROTATION "A"

Rotation Year.	Crops.		Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1913.	1914.	Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
3rd..	Oats..........	Hay..........	1	8 00	2 86	$12\frac{1}{2}$	2 12	......	$2\frac{1}{12}$	......	......	......
4th ..	Hay..........	Hay..........	1	8 00	3 36	12	2 04	......	$1\frac{1}{3}$	......	......	......
5th ..	Hay..........	Barley..........	1	8 00	1 84	4	68	......	$8\frac{1}{4}$	$4\frac{1}{4}$	......	......
1st...	Barley..........	Mangels..........	1	8 00	2 10	319	54 23	12	$7\frac{1}{2}$	12	......	......
2nd..	Mangels..........	Oats..........	1	8 00	1 98	$2\frac{1}{2}$	42	......	$9\frac{1}{2}$	......	......	......
	Aggregate..........		5	40 00	12 14	350	59 49	12	$28\frac{2}{3}$	$16\frac{1}{4}$	......	......
	Average per acre..........		......	8 00	2 43	70	11·89	2·4	5·7	3·2	......	......

ROTATION "B"

3rd ..	Wheat..........	Hay..........	1	7 50	5 12	12	2 04	......	$1\frac{5}{6}$	......	......	......
4th ..	Hay..........	Oats..........	1	7 50	1 96	$3\frac{1}{2}$	59	......	6	$5\frac{2}{3}$	......	......
5th ..	Oats..........	Hay..........	1	7 50	4 58	6	1 02	......	$1\frac{5}{6}$	......	......	......
1st...	Hay..........	Turnips..........	1	7 50	1 30	$134\frac{1}{2}$	22 86	9	$5\frac{5}{6}$	$15\frac{3}{4}$	......	......
2nd..	Turnips..........	Wheat..........	1	7 50	1 92	$3\frac{1}{2}$	59	......	$7\frac{1}{4}$	......	......	......
	Aggregate..........		5	37 50	14 88	$159\frac{1}{2}$	27 10	9	$22\frac{3}{4}$	$21\frac{1}{2}$	......	......
	Average per acre..........		......	7 50	2 97	32	5 42	2	$4\frac{1}{2}$	$4\frac{1}{3}$	......	......

ROTATION "C"

3rd ..	Oats..........	Hay..........	·57	3 42	1 63	11	1 87	......	$2\frac{1}{10}$	......	......	......
4th ..	Hay..........	Hay..........	·57	3 42	1 91	$8\frac{1}{4}$	1 60	......	$1\frac{1}{2}$	......	......	......
1st...	Hay..........	Potatoes..........	·57	3 42	4 51	43	7 31	$2\frac{1}{4}$	$15\frac{11}{12}$	......	......	......
2nd..	Corn..........	Oats..........	·57	3 42	1 13	$2\frac{3}{4}$	46	......	4	......	......	......
	Aggregate..........		2·28	13 68	9 18	65	11 24	$2\frac{1}{4}$	$23\frac{1}{2}$	......	......	......
	Average per acre..........		......	6 00	4 00	28·5	4 93	1	$10\frac{1}{3}$	......	......	......

ROTATION "D"

3rd ..	Wheat..........	Hay..........	1	8 77	4 58	$14\frac{1}{4}$	2 46	......	$1\frac{4}{5}$	......	......	......
1st...	Hay..........	Potatoes..........	1	8 77	8 31	90	15 30	6	$15\frac{7}{12}$	5	......	......
2nd..	Potatoes..........	Wheat..........	1	8 77	1 78	1	17	......	5	......	......	......
	Aggregate..........		3	26 31	14 67	$105\frac{1}{4}$	17 93	6	$22\frac{1}{3}$	5	......	......
	Average per acre..........		......	8 77	4 89	35	5 98	2	7·4	$1\frac{2}{3}$	......	......

CHARLOTTETOWN.

(Five years' duration).

in raising Crop.							Particulars of Crop.						
							Weight.						
Cost of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Roots, ensilage or green-feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	Inch.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
70	......	13 68	13 68	......	5 20	3	....	....	5,260	....	18 41	18 41	4 73
45	......	13 85	13 85	......	6 28	3	....	....	4,410	....	15 44	15 44	1 59
4 53	68	15 73	15 73	24	......	7	2,402	1,878	....	....	27 77	27 77	12 04
10 71	......	75 04	75 04	9·6	3 22	......	....	....	....	46,680	46 68	46 68	28 36
3 23	85	14 48	14 48	8	......	9½	2,849	3,865	....	....	36 22	36 22	21 74
19 62	1 53	132 78	......	......	......	......	....	....	....	....	144 52	......	......
3 92	31	......	26 56	......	......	......	....	....	....	....	....	28 90	2 34

(Five years' duration).

62	......	15 28	15 28	......	7 53	3	....	....	3,660	....	12 81	12 81	–2 47
4 36	45	14 86	14 86	27·9	......	7	1,810	3,106	....	....	24 42	24 42	9 56
62	......	13 72	13 72	......	14 07	3	....	....	1,950	....	6 83	6 83	–6 89
10 86	......	42 52	42 52	·06	2 01	......	....	....	....	42,180	42 18	42 18	–0 34
2 46	45	12 92	12 92	27·1	......	8	1,705	2,500	....	....	22 25	22 25	9 33
18 92	90	99 30	......	......	......	......	....	....	....	....	108 49	......	......
3 78	18	......	19 86	......	......	......	....	....	....	....	....	21 70	1 84

(Four years' duration).

71	......	7 63	13 38	......	4 50	3	....	....	3,390	....	11 86	20 81	6 43
50	......	7 44	13 05	......	4 88	3	....	....	3,045	....	10 66	18 70	5 65
5 41	......	20 65	36 23	18	......	......	....	....	....	6,960	58 00	101 75	65 52
1 36	34	6 70	11 75	18⅓	......	9	1,240	2,060	....	....	16 52	28 98	17 23
7 98	34	42 42	......	......	......	......	....	....	....	....	97 04	......	......
3 50	15	......	18 60	......	......	......	....	....	....	....	....	42 56	23 96

(Three years' duration).

62	......	16 43	......	......	7 64	3	....	....	4,300	....	15 05	15 05	–1 38
8 97	......	41 35	......	......	......	......	....	....	....	12,653	105 27	105 27	63 92
1 70	45	12 87	......	......	......	8	852	1,925	....	....	12 37	12 37	– 50
11 29	45	70 65	......	......	......	......	....	....	....	....	132 69	......	......
3 76	15	......	23 55	......	......	......	....	....	....	....	....	44 23	20 68

Charlottetown.

ROTATION "F"

Rotation Year.	Crops. 1912.	Crops. 1913.	Area.	Items of Expense: Rent and Manure.	Seed, Twine and use of Machinery.	Manual labour: Hours.	Manual labour: Cost.	Horse labour (including teamster). Hours: Single Horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
3rd..	Wheat........	Hay...........	·6	5 94	4 04	5½	93	......	1⅚	......	......	......
4th..	Hay...........	Barley	·86	5 94	1 73	3½	60	......	11	¾	......	......
1st...	Barley........	Turnips........	·86	5 94	1 23	107	18 19	18⅓	9¼	2	......	......
2nd..	Turnips........	Wheat.........	·86	5 94	1 69	3	51	......	7¼	¾	......	......
	Aggregate....................		3·44	23 76	8 69	119	20 23	18⅓	29⅓	3½	......	......
	Average per acre.............		......	6 90	2 53	34·6	5 88	5·32	8·52	1	......	......

ROTATION "G"

Rotation Year.	Crops. 1912.	Crops. 1913.	Area.	Rent and Manure.	Seed, Twine and use of Machinery.	Manual labour: Hours.	Manual labour: Cost.	Single Horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
3rd..	Corn..........	Oats..........	·4	1 89	76	2	34	......	4½	½	......	......
4th..	Oats..........	Hay...........	·4	1 89	69	3	51	......	⅚	......	......	......
5th..	Hay...........	Hay...........	·4	1 89	79	3	51	......	⅚	......	......	......
6th..	Hay...........	Hay...........	·4	1 89	79	2¾	47	......	⅚	......	......	......
7th..	Hay...........	Hay...........	·4	1 89	79	2¾	47	......	⅚	......	......	......
1st...	Hay...........	Oats..........	·4	1 89	75	1½	25	......	6 7/12	1½	......	......
2nd..	Oats..........	Potatoes.......	·4	1 89	3 20	32	5 44	2½	8¾	1¼	......	......
	Aggregate.....................		2·8	13 23	7 77	47	7 99	2½	22⅔	3¼	......	......
	Average per acre..............		......	4 73	2 77	16·8	2 85	1	8	1·16	......	......

CHARLOTTETOWN.

(Four years' duration).

in raising Crop.						Height of Stubble.	Particulars of Crop.						
							Weight.						
Cost of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.		Grain.	Straw.	Hay.	Roots, ensilage or green-feed.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	Cts.	$ c.	Inch.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
62	......	11 53	13 41	......	10 46	3	....	....	2,205	....	7 72	8 98	-4 43
4 05	40	12 72	14 79	25·9	......	7	2,364	....	....	....	31 92	37 12	22 33
8 90	......	34 26	39 83	5·4	......	......	....	....	....	38,315	38 31	44 55	4 72
2 77	51	11 42	13 28	70·66	......	8	969	....	....	....	13 92	16 18	2 90
16 34	91	69 93	......	......	......	......	....	....	....	....	91 87	26 71	....
4 75	26	......	20 32	......	......	......	....	....	....	....	....	......	..6 39

(Seven years' duration).

1 73	34	5 06	12 65	19	......	7	901	1,370	....	....	11 75	29 37	16 72
28	......	3 37	8 42	......	2 87	3	....	....	2,345	....	8 21	20 52	12 10
28	......	3 47	8 67	......	3 31	3	....	....	2,095	....	7 33	18 32	9 65
28	......	3 43	8 57	......	3 19	3	....	....	2,145	....	7 51	18 77	10 20
28	......	3 43	8 57	......	3 23	3	....	....	2,120	....	7 42	18 55	9 98
2 85	34	6 08	15 20	32	......	6½	647	....	....	....	8 95	22 37	7 17
4 15	......	14 68	36 70	13¼	......	......	....	1,240	....	6,640	55 33	138 32	101 62
9 85	68	39 52	......	......	......	......	....	....	....	....	106 50	......	......
3 50	24	......	14 11	......	......	......	....	....	....	....	....	38 03	23 92

Charlottetown.

SOIL CULTURAL EXPERIMENTS.

The land set apart for the soil cultural experiments was given a preliminary testing out in 1914. Four acres were planted with potatoes, no manure or fertilizer being applied. The field was given good cultivation throughout the season. The potatoes were sprayed regularly with Bordeaux mixture and Paris green.

There were 112 plots of potatoes in all. Great variations were found in the soil. Yields ranging all the way from 27 bushels per acre to 242 bushels per acre were recorded, the average being 90 bushels and 25 pounds per acre.

About 8 acres of the balance of the area was sown with Banner oats, without manure or other fertilizer. This was also used as a preliminary test, 181 plots of one-sixtieth acre being carefully measured and the returns recorded. The lowest yield was at the rate of 23½ bushels per acre, the highest a little over 50 bushels per acre, and the average for all, 35 bushels and 9 pounds. The greater part of the above land was tile drained in the early spring of 1914. The tramping and opening of the ditches with the plough when the land was wet, baked some sections worse than others, which may account for some of the extreme variations.

Experiments will be undertaken to get further information regarding:—

(1) The conservation and increase of soil fertility.
(2) The control and eradication of weeds.
(3) The improvement of neglected land.
(4) The conservation of soil moisture.
(5) The value of underdrainage.

DRAINAGE.

The land on the west side of the railway, known as the Connolly and Johnston properties, comprising in all about 18 acres, was tile drained in the spring. The drains were laid 33 feet apart as the land is all to be used in cultural experimental work. This work was completed in time for the spring seeding of almost the whole of the area.

The low lands on properties purchased from Harry Connolly, Judge Haszard and St. Dunstan's College were drained during the summer. The main from this system discharges into the ditch of the Prince Edward Island Railway just south of the De Blois road. A very old well was discovered during the ditching in the Harry Connolly field. It was well stoned and had an abundance of water during midsummer. A reinforced cement cover was placed over it. This well was connected with the tile system by a short overflow pipe, and will be very convenient for watering stock in the future. A 6-inch main was carried back to the swamp area that lies just north of the property purchased from the St. Dunstan's college.

IMPROVEMENTS.

Three rows of trees that divided the several properties purchased for the Experimental Station in 1913 were removed and the land stumped during the summer and autumn.

Shore sand was applied to the drained peat swamp just south of the plum orchard during the winter. It is expected that the sand will greatly improve the texture of this soil.

The junior grader used in connection with the split-log drag kept the farm roadway free from grass and in splendid condition throughout the season.

CHARLOTTETOWN.

Old Island black Oats. A good stand after corn. Charlottetown, P.E.I.

Making Hay on the Marsh Land at Experimenta Farm, Nappan, N.S., 1914.

EXPERIMENTAL FARM FOR NOVA SCOTIA, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

WEATHER CONDITIONS.

During the winter of 1913-14 a most satisfactory covering of snow remained on the ground from the 25th of December to the second week in March. During the latter part of March and the first part of April, however, there was alternate thawing and freezing which killed the clover and reduced the hay crop considerably. April was unsettled throughout. May gave promise of being a favourable month, but a change took place toward the latter part and June came in with light flurries of snow and low temperatures. Notwithstanding this, all grain was sown during the occasional fine days of the last week in May and the first of June. The weather continued cool during the remaining part of the month. Nevertheless, germination took place much more rapidly this year than last. The grain was only seven days in showing above the ground, whereas last season it was from eighteen to twenty. Neither corn nor grain made much growth until the latter part of July, then both came on very rapidly. July and August were, undoubtedly, the best growing months. Very favourable conditions existed until the latter part of September, from which time dull, cold weather prevailed until the end of the season, with an occasional fine day. Up to the 16th of October weather conditions were most favourable for harvesting, but a cold wet spell ensued after that date, which caused some delay. Heavy frosts were recorded during the early part of the month. Only fair progress could be made in the fall ploughing, as much of the land was too wet. The total precipitation was 2·46 inches. Cold, wet weather prevailed throughout the first three weeks in November. The remaining part was very fine and mild. The total precipitation for this month was 2·97 inches. The weather was rather unsettled during December. The first two weeks were fairly fine, with occasional snow flurries. Fairly heavy showers, with low temperatures, characterized the latter part.

It may be said that the fall was a very open one with considerable rainfall, followed by a very open winter with much mild weather during the latter part.

SOME Weather Observations taken at Nappan Experimental Farm, 1914.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
January	46	—19	13·5	1·30	17·00	3·00	92·40
February	42	—27	7·5	·30	23·00	2·60	138·50
March	46	8	30·17	1·73	4·00	2·13	107·85
April	61	8	33·94	1·89	18·00	3·69	172·05
May	79	24	49·03	·75	....	·75	147·10
June	77	26	54·19	4·23	....	4·23	243·50
July	84	35	61·54	3·61	....	3·61	255 00
August	84	40	62·84	2·95	....	2·95	210·80
Sept mber	84	33	56·25	3·05	....	3·05	161·75
October	69	20	47·02	2·46	....	2·46	139·35
November	60	07	33·59	2·97	....	2·97	85·75
December	51	—17	20·22	1·46	....	1·46	110·15
Total for year				26·70	62·00	2·90	1,864·20
Average for six years				30·83	56·74	36·71	2,003·04
Total for six growing months, April to September				16·48	13·0	18·28	1,190 20
Average of five years for six growing months, April to Sept.				17·56	6·3	18·19	1,298·65

NAPPAN.

FIELD CROP YIELDS.

The yields of crops grown in field lots and under field conditions averaged as follows in 1914:—

Area.	Crop.	Yield per acre.		Yield per acre.	
Acres.		Tons.	Lb.	Bush.	Lb.
*	Mangels	8	1,507		
	Turnips	18	431	607	11
5	Corn	10	1,893		
50	Marshland Hay	1	968		
	Upland Hay	2	241		
3⅛	Wheat			31	31
7	Oats			62	21
2	Barley			54	2
11	Mixed grain			40	16
	Potatoes			229	30

COST OF PRODUCTION OF FIELD CROPS.

In computing the cost of the various field crops, fixed values as given on page 182 of this report have been used. The items for which there are no fixed charges have been valued as follows:—

Twine	$0 15	per pound.
Grass seed	0 10½	"
Clover	0 25	"
Turnips	0 25	"
Mangels	0 25	"
Corn	0 04	"
Potatoes	0 50	bushel.

The following table gives the approximate cost of the various field crops:—

Crop.	Yield per acre.				Cost to Produce.		
					Per acre.	Per ton.	Per bush.
	Tons.	Lb.	Bush.	Lb.	$ cts.	$ cts.	cents.
Turnips	18	431	607	11	45 56	2 65	7·88
Ensilage corn	10	1,893	......	......	30 75	2 80	....
Potatoes	......	......	299	30	49 25	....	13·10
Oats	......	......	62	21	15 88	....	24·2
Wheat	......	......	31	31	13 8	....	43·7
Barley	......	......	54	22	12 78	....	23·7

ROTATION OF CROPS.

The three rotations which are in operation on this Farm were again continued according to the following schedule, and accurate notes were taken during the season. The expense incurred in producing the various crops grown on these rotations will be found in detail in the tables which follow.

The importance of this work to the average farmer justifies our emphasizing it once again. Only by following some regular rotation can the agriculturist engaged in mixed farming realize the greatest returns. The three rotations conducted at this Farm and explained in detail in the following pages, were chosen as being best suited to the general conditions in Nova Scotia. They may quite easily be modified to conform with any particular conditions that may be met with and beneficial results will undoubtedly follow the adoption of any one of them.

Where the agriculturist has sufficient pasture at his disposal, either the rotation "B" or "D" would probably be best suited to his conditions. On the other hand, the farmer having a fairly large herd of cattle, and no available pasture, would derive the greatest benefit from rotation "C." By a close and intelligent study of his particular conditions, and the adoption of the most suitable rotation, the agriculturist will have taken a very decided step toward the "increased agricultural production" which is of such great importance at the present time.

The following is a description of the three rotations in operation here:—

ROTATION "B" (FIVE YEARS' DURATION).

First year.—Roots or corn, manured at the rate of 25 tons per acre.

Second year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike and 6 pounds timothy per acre.

Third year.—Clover hay, after which aftermath of clover is ploughed under in the autumn.

Fourth year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike and 6 pounds timothy per acre.

Fifth year.—Clover hay, ploughed in the autumn.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Roots or corn, manured at the rate of 20 tons per acre.

Second year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike and 6 pounds timothy per acre.

Third year.—Clover hay.

Fourth year.—Pasture, ploughed in the fall for roots.

ROTATION "D" (FIVE YEARS' DURATION).

First year.—Roots or corn, manured at the rate of 15 tons per acre.

Second year.—Grain, seeded down with 10 pounds red clover, 2 pounds alsike and 6 pounds timothy per acre.

Third year—Clover hay, aftermath ploughed under in the autumn for roots or corn again.

In order that comparative results may be obtained from year to year in estimating the cost, etc., of the various operations conducted on these rotations, it was deemed necessary to establish fixed valuations from which calculations could be made. Accordingly, these values are used during the different years, regardless of fluctuations in the rate of wages and value of products. These constant values, moreover, permit of a much fairer comparison of the different rotations and of the periods of years within a single rotation. These values, including cost and return, are given on page 182 of this report.

NAPPAN.

ROTATION "B"

Rotation Year.	Crop. 1913.	Crop. 1914.	Items of Expense: Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour: Hours.	Manual labour: Cost.	Horse labour (including teamster). Hours: Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.	Value of horse labour.
			Acre	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.	$ c.
4th...	Clover Hay	Grain.......	8	64 00	21 80	16	2 72	......	120	......	10	......	45 60
3rd...	Grain......	Clover Hay	8	64 00	29 20	29·2	4 96	3·06	21·16	......	......	......	8 01
2nd...	Roots.....	Grain.......	8	64 00	21 80	16	2 72		104	......	10	......	40 16
1st....	Green Crop	Roots.......	8	95 04	10 80	420	71 40	268	144	......	20	......	130 92
5th...	Green Crop	Soiling Crop	8	......	......	......	......	......	......	......	......	......	......
Aggregate............			40	287 04	83 60	481·2	81 80	271·00	389·16	......	40	......	224 69
Average per acre.........			......	7 18	2 61	15·0	255	8·47	12·16	......	1·25	......	7 02

ROTATION "C"

3rd...	Grain......	Clover Hay	5	40 00	18 25	18·2	3 09	1·9	13·20	......	......	......	4 99
2nd...	Roots.....	Grain.......	5	40 00	13 62	10·0	1 70	......	66·25	......	6·25	......	25 52
1st....	Pasture....	Roots–Corn	5	40 00	13 62	742·0	126 14	104·0	73·75	......	12·50	......	59 15
4th...	Clover Hay	Pasture.....	5	40 00	7 62	......	......	......	......	......	......	......	......
Agregate................			20	160 00	53 11	770·2	130·93	105·9	153 20	......	18·75	......	89 66
Average per acre.........			......	8 00	2 65	38·5	6·55	5·3	7·66	......	·94	......	4 48

ROTATION "D"

1st....	Clover Hay	Roots......	5	40 00	9 30	600 00	102 00	162·50	108·50	......	12·50	......	86 70
3rd...	Grain......	Clover Hay	5	40 00	18 25	18·20	3 09	1·90	13·20	......	......	......	4 99
2nd...	Roots......	Grain.......	5	40 00	13 62	10·00	1 70	......	68·25	......	6·25	......	26 23
Aggregate...............			15	120 00	41 17	628·20	106 79	164·40	189·95	......	18·75	......	117 92
Average per acre.........			......	8 00	2 74	41·88	7 11	10·9	12·66	......	1·25	......	7 86

SESSIONAL PAPER No. 16

(Five years' duration.)

IN RAISING CROP.						PARTICULARS OF CROP.						
						Weight.						
Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of Stubble.	Grain.	Straw.	Hay.	Hoed Crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	Cts.	$ c.	Inch.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
....	134 12	16 76	21	......	....	14,900	20,205	....	....	189 41	23 67	6 91
....	106 17	13 27	......	6 76	....	....	....	31 390	....	109 86	13 73	0 46
....	128 68	16 08	24·5	......	....	13,247	26,318	....	....	185 11	23 13	7 04
....	308 16	38 52	6.6	2 22	....	....	....	....	277,465	277 46	34 68	—3 84
....	......	......	......	......	....	....	....	....	....	....	....	....
....	677 13	......	......	......	....	....	....	....	....	761 84	....	....
....	......	21 15	......	......	....	....	....	....	....	....	23 80	2 65

(Four year's duration).

....	66 33	13 26	......	5 36	....	....	....	24,715	....	86 50	17 30	4 04
....	80 84	16 16	19·7	......	....	9,203	23,376	....	....	138 78	27 75	11 59
....	238 91	47 78	......	4 36	....	....	....	....	109,469	109 47	21 89	—25 89
....	47 62	9 52	......	......	....	....	....	....	....	102 25	20 45	10 93
....	433 70	......	......	......	....	....	....	....	....	437 00	....	....
....	......	21 68	......	......	....	....	....	....	....	....	21 85	0 17

(Three years' duration).

....	238 00	47 60	8·1	2 72	....	....	....	....	174,997	175 66	35 13	—12 47
....	66 33	13 26	......	6 88	....	....	....	19,280	....	67 48	13 49	0 23
....	81 55	16 31	22·8	......	....	7,800	14,540	....	....	107 08	21 41	5 10
....	385 88	......	......	......	....	....	....	....	....	350 22	....	....
....	......	25 72	......	......	....	....	....	....	....	....	23 34	— 2 38

NAPPAN.

COMMERCIAL FERTILIZERS FOR TURNIPS.

Five varieties of turnips were sown in plots of 1 acre each, one-half the plot in each acre being fertilized with barnyard manure and commercial fertilizer. In all cases the barnyard manure was applied at the rate of 25 tons per acre. The commercial fertilizer was applied at the rate of 400 pounds per acre, and was made up in the following proportions: Superphosphate, 1½ pounds; bone meal, 1½ pounds; nitrate of soda, 1 pound; muriate of potash, 1 pound.

The purpose of this experiment was to ascertain what benefit would be derived by the use of such a fertilizer in conjunction with barnyard manure in growing turnips.

When harvested, the roots were carefully weighed and the results computed. These results were as follows:—

COMMERCIAL Fertilizer for Turnips.

Variety.	Size of Plot.	Date of Sowing.	Fertilizers Applied per Acre. Barnyard Manure.	Commercial Fertilizer. Weight.	Commercial Fertilizer. Value.	Yield per acre.		Value of Crop at 6cts. per bush.	Profit or Loss due to Commercial Fertilizer.
	Acres.		Tons.	Lb.	$ cts.	Bush.	Lb.	$ cts.	$ cts.
Jumbo	½	June 24	25	....	....	502	40	30 16	....
"	½	" 24	25	400	7 76	471	10	28 27	−9 65
Rennie's Prize	½	" 24	25	....	....	371	....	22 26	....
"	½	" 24	25	400	7 76	539	....	32 34	2 32
Magnum Bonum	½	" 24	25	....	....	726	40	43 60	....
"	½	" 24	25	400	7 76	699	40	41 90	−9 38
Sutton's Champion	½	" 24	25	....	....	627	20	37 64	....
"	½	" 24	25	400	7 76	652	40	39 16	−6 24
Canadian Gem	½	" 24	25	....	....	537	30	32 25	....
"	½	" 24	25	400	7 76	662	....	39 72	−0 29

In comparing this year's results with those of last year, we find them very similar; that is, both indicate that the foregoing combination of manure and commercial fertilizer does not give a sufficient increase in crop to justify its use. This experiment has now been conducted for three consecutive years, and the results obtained coincide. We are justified, therefore, in assuming them fairly conclusive.

The following table gives the average of the results obtained in this experiment during the three years it was conducted:—

Plot.	Average yield for three years with manure alone.				Average yield for three years with manure and fertilizer.				Average loss for the three years.
	Tons.	Lb.	Bush.	Lb.	Tons.	Lb.	Bush.	Lb.	$ cts.
1	28	1,700	795	6	25	1,556	859	16	3 26
2	19	460	641	0	21	353	705	53	3 27
3	22	1,143	752	23	22	1,965	766	5	6 29
4	19	806	646	46	18	806	613	26	9 11
5	17	1,946	599	6	15	1,706	695	6	1 35

NAPPAN.

BREAKING NEW LAND.

Some 16 acres of new land were broken up during the summer months. The stumps were very thick in parts, but well rotted, making the stumping quite easy. The piling and grubbing out of the second-growth spruce and fir was the most tedious job. The land was very free from stone, but very rough, which will necessitate two ploughings before it can be cropped to any extent. It is also very wet, and should be underdrained before cropping. The total cost up to date for stumping, piling, burning and breaking these 16 acres was $387.31, or a cost per acre of $24.20. It will require one more burning off to be clear of all stumps. Part was harrowed once. When the whole field, which is about 25 acres in extent, is cleared and ploughed it will add a great deal to our workable land, and will be a great improvement to the Farm.

Just east of this 25-acre field, some 30 to 50 acres were logged during the winter of 1913-14, yielding 2,500 nice logs, spruce and hemlock. These, when manufactured into lumber, gave some 123,092 feet of excellent lumber, which is being used on the Farm for constructing new buildings and repairing others. During the spring and winter of 1914, some 15 acres of this land were cleared, all the material taken off producing about one hundred cords. Some poles were cut for repairing back fences.

A record of the cost of chopping and clearing this land is being kept; also the value of the material taken off, in order to get more data on the cost of clearing new land.

NAPPAN.

EXPERIMENTAL STATION, FOR ANNAPOLIS AND CORNWALLIS VALLEYS, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SAXBY BLAIR.

The Field Husbandry work at this Station during the past season has been largely that of growing fodder corn, and grain for stock, and the clearing of land for future crops. Seventeen acres of land cleared last season and four acres cleared in 1912 were seeded to oats. Ten acres of corn were grown on land between the apple trees, which ground was previously in potatoes. Five acres in the orchard were planted also to turnips. No rotation work has been attempted, and will not be possible until more land has been cleared. Fifteen acres have been cleared of green stumps ready for seeding next spring.

CHARACTER OF SEASON.

The season has on the whole been a favourable one for field crops. The spring was late, and seeding was not possible until after the middle of May. During June, grain crops came on well. The corn, on the other hand, owing to cool weather in June, made very slow growth. Early seeded corn in some places was damaged by the last frost, on June 4. This frost was very light and did no damage at this Station to the corn, which was just coming through. July was a dry month, only 1·45 inch of rain having fallen, and this checked growth somewhat. The precipitation during June being 4·2 inches, there was a good reserve for the crops, and they did not suffer as much as would have been the case had June been dry. July weather was cool, with no hot drying winds, which also materially assisted in assuring a good moisture supply. August and September were good months for crops generally and, for the most part, the grain crops were harvested in good condition. September being warm, corn made good growth and was fairly well matured when harvested.

Some Weather Observations taken at Kentville Experimental Station, 1914.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	19·68	50	−5	1·18	16·25	2·80	·55	91·6
February	14·19	43	−17	·79	18	2·59	·40	118·7
March	30·72	50	11	3·13	6	3·73	·63	118·2
April	36·8	72	16	1·48	8·5	2·33	·93	196·
May	50·72	84	23	1·26	2	1·46	·78	189·6
June	56·2	82	32	4·2	....	4·2	1·10	250·3
July	62·88	85	39	1·45	....	1·45	·61	238·9
August	63·	87	40	2·58	....	2·58	·55	211·1
September	57·6	88	35	3·65	....	3·65	1·06	173·8
October	49·5	70	25	1·90	....	1·90	·43	158·2
November	36·4	65	5	3·09	1	3·19	·80	109·7
December	22·89	56	6	1·57	10·18	2·58	·68	85·1
Total for year				26·28	61·93	32·46	....	1,941·2
Average for year				....	....	2·70	....	161·7
Total for six growing months, April to September				14·62	1·05	15·67	....	1,259 7
Average for six growing months, April to September				....	....	2·61	....	209·9

OATS.

The 17 acres which were cleared of green stumps and ploughed in 1913 were seeded to Banner oats on May 28 and 30. This land was twice harrowed, after which all the roots harrowed up were gathered, piled and burnt, and the stone removed. This land is only fairly even and, as would be expected on such land, is not very level. It was thought desirable to seed this field to timothy and clover for hay next season. These were sown at the rate of 8 pounds Canada red clover, 2 pounds alsike clover and 8 pounds timothy seed per acre. The oats were seeded with the disc drill at the rate of 3 bushels per acre. Five acres of this land were fertilized broadcast with a complete fertilizer made up of nitrate of soda, acid phosphate and muriate of potash, which contained 4 per cent of nitrogen, 8 per cent of phosphorus and 5 per cent of potash. This was sown at the rate of 400 pounds per acre, after the second harrowing, and harrowed in before seeding. As would be expected, the growth of grain, clover and grass was uneven, but on the whole a fairly even stand of clover and timothy has been secured. The crop was harvested on the 9th and 10th September, the following yields being obtained:—

	Yield per acre. Bushels.	Total Yield. Bushels.
5 acres Banner oats with fertilizer	53.2	266
12 acres Banner oats without fertilizer	40.6	487.2

On June 4 a field of 4 acres was seeded to Improved Ligowo oats at the rate of 3 bushels per acre. This land was taken out of green stumps in the fall of 1912 and was in buckwheat in 1913, which crop was ploughed under. The oats were harvested September 16. No fertilizer has been used on this land. The yield was 37·8 bushels per acre, or a total of 151·2 bushels.

CORN.

The soil on which the corn was planted is light and of medium fertility. This land was in potatoes in 1913, and for that crop was fertilized with a complete fertilizer at the rate of 500 pounds per acre; it was cleared from green stumps in 1911, and was in buckwheat in 1912, which crop was ploughed under. This area consists of strips 30 feet wide between the orchard trees, which are planted 40 feet apart, the corn being sown in rows 3½ feet apart and at the rate of 40 pounds per acre.

The ground was manured at the rate of 15 tons stable manure per acre, put on with the manure spreader and ploughed under. Fertilizer at the rate of 300 pounds per acre was sown broadcast and harrowed in before the corn was planted. The fertilizer was made up of nitrate of soda, sulphate of ammonia, acid phosphate and muriate of potash, and contained 4 per cent nitrogen, 8 per cent phosphorus and 5 per cent potash. Nitrate of soda and sulphate of ammonia were used in equal proportions in making up the above fertilizer. The first corn was seeded May 22, and another area on the 25th. The balance of the corn was planted June 3. The yield of corn is as follows:—

	Yield per acre. Tons.	Lb.
2 acres Compton's Early..	13	925
2 " Longfellow..	13	400
6 " "	11	225

The total yield of corn from this area was 120 tons, an average of 12 tons per acre. The Compton's Early gave a little better yield per acre, but was not as well matured at the time of harvest as the Longfellow. The 2 acres each of Compton's Early and Longfellow were planted at the same time, June 3. The land on the upper areas of this field, is a little better than the lower part, which accounts for the heavier growth, and also part of

the corn was frosted on October 1, and dried out before harvest, which would lessen the yield somewhat. The corn was harvested the last week in September and the first week in October, and, on the whole, was fairly well matured.

TURNIPS.

Two acres of turnips were sown on June 3 on an area which was in turnips last season. This land was used because other suitable land was not available. Two acres were worked up in the orchard adjoining the corn, and seeded June 11. These fields were manured with 15 tons stable manure per acre and 400 pounds fertilizer made up of nitrate of soda, sulphate of ammonia, acid phosphate and muriate of potash, containing 4 per cent nitrogen, 8 per cent phosphorus and 5 per cent potash. This fertilizer is similar to that used on the corn field.

One acre, on which winter rye had been cut for green feed, was seeded to turnips. This area was manured with 15 tons stable manure per acre, ploughed and harrowed, after which it was rolled. The seed was sown on the level ground with the hand seed drill on July 4. The growth was good and, considering the date of seeding, a very good crop was obtained. The turnips were harvested November 9 to 12, and yielded as follows:—

	When seeded.	Yield per acre.	
		Bushels.	Lb
2 acres Lapland..	June 3	634	35
1 " "	" 11	685	25
1 " Kangaroo..	" 11	711	10
½ " Lapland..	July 4	496	40
½ " Kangaroo..	" 4	485	20

Total turnips harvested from field areas, 3,013 bushels 10 pounds.

WINTER RYE.

One and one-half acres of winter rye were sown on September 12, 1913, on land which had been in grain; it was seeded at the rate of 1½ bushels per acre. This was fit for cutting for green feed for stock the first week in June, and furnished excellent feed during the next two weeks. This crop was followed with turnips, as stated above.

HAY.

As yet the area in hay is limited, and consists of 8 acres of marsh land which it is proposed to drain and put into proper shape next season. A greater part of this area was dyked last season, and the quality of hay produced is not very high. The yield was 12 tons 635 pounds. In addition to this, some hay was gathered at other places on the farm, making the total crop harvested 16½ tons.

FENCING.

In order to give some pasturage to the stock it was necessary to put a fence along the west side of the ravine running from the main road to the back of the Farm. This has been completed only in part, but sufficient to inclose the stock on the lower parts of the ravine. Fifty-four hundred feet of wire fence was erected for this purpose, and consists of cedar posts set a rod apart and six strands high of plain wire. This fence, for the most part, was put on very rough ground, which made the work very difficult.

KENTVILLE.

ROADS.

In order to get a road for stock to the upper fields without having to fence the principal road through the Farm, it was considered advisable to construct a road along the west edge of the ravine, which made it necessary to clear and stump an area about 30 feet wide for a distance of about 2,850 feet. This road has been partially graded, but will require considerable additional work next spring. The fence was placed along the west side of the road.

DRAINAGE.

In order to render the land uniform, two underdrains were put in across a low-lying area in the field given up to permanent fertilizer plots. These drains were 1,500 feet long. In addition to this, short drains amounting to 500 feet were necessary at other places, making a total of 2,000 feet of underdrains put in.

CLEARING LAND.

Twenty acres of land have been cleared of stumps during the past season. Eighteen acres of this will be ready for crop next season, and the other 2 acres are those cleared for a road and fence. One 7-acre block cleared this year, which it is proposed to plant with corn next year, has cost as follows:—

420 pounds dynamite at 18 cents per pound	$ 75 60
Fuse, 1,250 feet	11 25
Caps, 1,000	12 50
Dynamiting	61 25
Cutting sprout growth	35 00
Stumping	591 50
Cleaning roots, piling and burning	213 99
Ploughing	169 75
Removing stone	108 75
Harrowing, piling and burning roots	97 35
Cross ploughing	68 50
Removing roots and stone	79 30
Harrowing and removing roots	62 80
Total cost for seven acres	$1,587 54
Cost per acre	226 79

EXPERIMENTAL STATION FOR NEW BRUNSWICK, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

WEATHER CONDITIONS, 1914.

The winter was unusually cold and, at times, intensely so, with the result that records for January, February and March show an average mean temperature 2·5 degrees lower than the average mean for these same months during the past forty years. The total snowfall was not above the average, but covered the ground continuously from December 24 to April 10, thus frost did not penetrate so deeply as in more open winters. April was characterized by cold, high winds and excessive precipitation. May was also cold, windy and backward, but the rainfall was unusually light, thus making conditions favourable for spring cultivation. Cold, backward weather continued throughout June and the fore part of July, consequently all crops made slow growth till almost the 1st of August, at which date such crops as corn and tomatoes were particularly unpromising. Climatic conditions during August and September however, favoured rapid growth and crops eventually were very good. Ideal weather conditions rendered it possible to harvest hay, grain, roots, etc., in excellent condition.

Some Weather Observations taken at Experimental Station, Fredericton, 1914.

Month.	Temperature F.			Precipitation.	Total Sunshine.
	Highest.	Lowest.	Mean.		
	°	°	°	Inches.	Hours.
January	51	−11	22	4·1	81
February	38	−20	12	2·9	123
March	60	− 9	30	6	124
April	64	− 3·5	33·6	4·54	200·9
May	89·5	24	54·9	1·095	189
June	88·5	28	58·2	4·34	262
July	88·5	40	65·2	2·595	260·5
August	85	39·5	64·8	3·73	205
September	89·5	30	59	2·78	186·8
October	77·5	12	47·7	2·775	129·71
November	57	3	30·58	2·75	98·4
December	47	−22·5	17·19	2·03	133·45
Total for year				39·635	1,993·76
Total for six growing months, April to September 1914				19·08	1,304·2
Total for six growing months, April to September 1913				16·9	1,247
Average for 41 years				43·8	1,996

The following records regarding field operations and the weather may be of interest:—

First seeding of field grain	May 23.
First planting of potatoes	May 9.
First sowing of corn	June 3.
Date of commencing hay harvest	July 20.
Date of commencing grain harvest	September 9.
Date of commencing cutting corn	September 30.
Date of freezing up	November 18.

CROP YIELDS.

OATS.

Thirty-five acres of newly cleared land were sown to oats. The land having been ploughed once only, the surface was very uneven, and contained many small roots. The seed-bed was therefore not ideal, and the seed had to be sown broadcast. A number of varieties were sown, the rate of seeding being 3 bushels per acre.

Seeding commenced May 23, 4½ acres of Banner oats being sown on land cleared and ploughed the preceding year. No manure or commercial fertilizer was used, and the total yield was 220 bushels or 44·4 bushels per acre. Four and three-quarter acres sown to Newmarket oats on May 27 yielded 200 bushels, an average of 42·1 bushels per acre. The remaining 25¾ acres were sown to Early Blossom, P. E. I. Banner, Home Grown Banner and Newmarket oats on May 28, 29 and 30, yielding 583 bushels or 22·7 bushels per acre. The average yield per acre for the whole crop was 22⅗ bushels.

BUCKWHEAT.

Seven and one-half acres of newly cleared land were ploughed and sown to buckwheat on June 27, at the rate of 1 bushel per acre. With the seed were sown 220 pounds per acre of 2-5-8 fertilizer. The land was very rough and uneven and in an unfavourable condition for crop production. The total yield was 136 bushels or slightly over 18 bushels per acre.

The cost of production of these crops cannot be given, as the clearing of new land is not properly chargeable to the first crop grown thereafter.

TURNIPS.

Turnips were sown upon 8 acres of land that had produced corn the previous year. Owing to the prevalence of mustard it was considered best to use a hoed crop again on this land.

In 1913 the land was manured for corn at the rate of eighteen 35-bushel loads of horse manure and 468 pounds of 3·6-10-5·5 fertilizer mixture per acre. After the corn was harvested the land was ploughed, and in the following spring it was worked early, and at intervals, with drag and disc harrows. Sixteen 35-bushel loads of horse manure were applied and incorporated with the soil. Three hundred pounds of basic slag and 265 pounds of 3-10-4 fertilizer per acre were applied broadcast, and the land was put up in shallow ridges with a potato planter. The ridges were then rolled and the turnip seed sown with a hand drill at the rate of 4 pounds per acre, a quantity which was found scant enough in portions of the field. One and one-half acres had to be re-seeded owing to destruction by fly, and a further portion of the field was only saved from destruction by spraying the young plants with arsenate of lead.

To test the value of the 3-10-4 fertilizer, one-half acre, which received none of the fertilizer in 1914, was used as a check plot and compared with a contiguous half-acre plot. The increased yield per acre due to the fertilizer was 43 bushels 20 pounds of turnips, which, valued at 10 cents per bushel, would amount to $4.34. The cost of the fertilizer per acre was $4.89.

FREDERICTON.

The total yield from 8 acres was 188 tons 353 pounds, making an average yield per acre of 940·8 bushels. The total cost of labour required to raise and harvest the turnips was $360.66, which is equal to $45.08 per acre, $1.91 per ton or 4·8 cents per bushel.

SUGAR BEETS.

Three varieties of sugar beets were grown on land which in 1913 produced a crop of corn, after having received an application of eighteen 35-bushel loads of horse manure per acre. In the fall the land was ploughed and the following spring it was worked early. An application of sixteen 35-bushel loads of horse manure was incorporated with the soil, after which the beet seed was sown on June 12, in rows 30 inches apart. Frequent inter-row cultivation was given, and the plants were thinned to 8 inches apart. The crop was harvested on October 31, the varieties tested yielding as follows:—

Vilmorin B..	484 bushels per acre.
Vilmorin A..	431·7 " "
Très Riche..	410 " "

CARROTS.

Five varieties of carrots were grown on land which was treated both in 1913 and 1914 as for sugar beets. The plants were thinned to 4 inches apart, and the varieties tested yielded as follows:—

Giant White Vosges..	725·3 bushels per acre.
Improved Short White..	481 " "
Mammoth White Intermediate..	471·6 " "
White Belgian..	418·1 " "
Ontario Champion..	411·5 " "

INDIAN CORN.

Fourteen acres of corn were grown on naturally well-drained sandy loam soil, 10 acres of which had produced potatoes and turnips the previous season, 1 acre had produced corn, and the rest was from fall-ploughed sod. The field was badly infested with mustard, hence it was deemed advisable to again use a hoed crop on this area. In preparation for the corn the land received a dressing of sixteen 35-bushel loads of horse manure and 250 pounds of 4·37-9·37-6·25 fertilizer per acre. This field was kept well cultivated, the whole area being carefully hand-hoed once, and that which was ploughed out of sod being hoed twice in order to control mustard and couch-grass. The corn was cut on the first of October, at which date it was fairly well eared, the grain being in the thin-milk stage, and the stalks from 8 to 9 feet in height. The average yield was 9 tons per acre, the cost of labour to raise, harvest and put in the silo was $26.49 per acre or $2.94 per ton.

A test showed that the application of 250 pounds of 4·37-9·37-6·25 fertilizer increased the yield of Early Longfellow corn 674 pounds per acre. Valuing corn at $3 per ton, the increased value of the crop per acre due to the fertilizer was $1.01; the cost of the fertilizer, however, was $3.61 per acre.

CLEARING LAND.

Before seeding, the stones and roots were picked from 30 acres of land which had been ploughed the previous fall. At a total cost of $4,865.24, 56 acres were stumped and left ready for cropping in 1915. While part of this land was comparatively free from stone, the rest was extremely stony and rocky, containing both large and small boulders, the breaking up and removal of which materially increased the cost of clearing. The method employed was to first break the boulders and shatter the stumps by

means of stumping powder, then remove the stone and pull the remaining parts of stumps by teams. After piling and burning the stumps, the land was ploughed. An efficient power stump puller capable of lifting 25 tons weight was tried, but the additional labour necessary to manipulate the tackle and remove the earth from the roots of the raised stump made the method more expensive than the one previously described. On an average a man can blow out a stump in about three minutes at a cost of from 10 to 35 cents for stumping powder, and it was found that the explosives are most effective when the ground is wet. The average cost per acre totally to clear the land, plough it, removing all stones touched by the plough, and thus leave the ground in condition for cropping was $86.88. The highest cost was on 4¾ acres of very rough and rocky land which it was desired to clean up thoroughly for orchard purposes.

FENCING.

Five hundred and sixty-five rods of fencing of No. 9 woven wire, 4 feet high, were constructed along the Wilsey road, the main farm road, and about the buildings. Turned cedar posts set 1 rod apart were used. Two hundred and ninety rods of divisional fence between fields, with ordinary cedar posts, were also erected, as well as 160 rods of special 5-foot woven wire poultry fence which was placed above close boarding 2 feet high. Two hundred and thirty rods of woven wire fencing and 89 rods of three strand barbed wire fence were temporarily erected on stakes, to inclose pastures. The season's fencing aggregated 2⅔ miles of permanent fence and 1 mile of temporary fence, and necessitated the setting of 575 turned cedar posts, 310 plain cedar posts and 325 stakes, with which were used twenty stretching posts.

DRAINAGE.

From five to twelve men were fairly steadily employed from May till November digging drains and laying tiles, and in all about 30 acres were underdrained. Most of the drains were placed 30 feet apart, with all tile at least 3 feet below the surface. These drains have been so placed as to become a part of a complete drainage system, and so far have done excellent work. Much time has been spent in draining wet spots that it is desired to crop, and in constructing mains preparatory to next season's work.

Some of the work was done by contract, but in no case was it possible to keep the cost as low as is reported for some places, owing to the fact that after the first foot of soil had been removed the use of picks was constantly necessary in order to loosen the stiff subsoil. Also it was necessary to use considerable dynamite to remove boulders.

The whole Station between the Canadian Pacific railway and the St. John river was surveyed for drainage purposes by Mr. W. R. White, and the work will be proceeded with systematically from year to year.

Herewith is a statement of the tiles laid and cost:—

	Number.	Cost.	Rods.
Tiles	17,220 three-inch	$ 403 20	1,044
"	5,344 four-inch	160 20	324
"	1,096 six-inch	166 84	66
Labour		2,676 33	
Dynamite, tar paper, etc		25 48	
Total		$ 3,432 05	1,434

EXPERIMENTAL STATION FOR EASTERN QUEBEC, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOSEPH BEGIN.

WEATHER CONDITIONS, 1914.

The season of 1914 was characterized by sudden variations in temperature and a meagre precipitation, especially during the summer months. Although the snow disappeared at an early date, the frost was not out of the ground until the beginning of May. Very wet and cool weather prevailed during May and June, rain being recorded on twenty-nine different days between May 1 and June 25, consequently the spring was unfavourable for seeding operations. The first sowing of grain was done on the 9th of May, and the following day at least an inch of snow fell. This grain did not come up until May 23, nevertheless it yielded 5 per cent more grain weighing 2 pounds more per bushel than did grain sown on another field having similar soil conditions, on May 18. This fortunate experiment tends to show the advisability of sowing grain as early as possible, even when the spring is cold. The precipitation in July and August was 0·64 and 1·04 inch respectively. The excessive drought hastened the ripening of the grain and caused a material decrease in the yield. The straw was very short, but the grain was of good quality and yielded better than had been anticipated.

SOME Weather Observations taken at Experimental Station, Ste. Anne de la Pocatière, 1914.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
January	38·4	−30·6	12·9	·30	18·0	2·10	92·2
February	36·2	−32·6	5·9	....	13·0	1·30	104·3
March	47·0	− 3·0	24·4	·08	12·0	1·28	139·8
April	60·0	6·2	31·3	·54	5·5	1·09	174·6
May	80·4	22·0	53·4	3·18	1·0	3·28	244·4
June	81·4	32·4	56·8	·92	....	·92	235·6
July	91·4	37·2	63·6	·64	....	·64	288·2
August	89·4	34·6	60·0	1·04	....	1·04	238·8
September	82·4	31·8	50·5	2·34	....	2·34	178·6
October	66·2	30·0	47·2	3·46	1·5	3·61	112·8
November	47·0	2·0	24·4	1·19	8·0	1·99	80·8
December	45·0	−24·2	9·6	·24	6·5	·89	103·0
Total						20·48	1,993·1
Total for six growing months, April to September						9·31	1,360·2

NOTE.—Ten inches of snow equal one inch of rain.

CROP YIELDS.

The following are the yields of hay, roots, corn and oats per acre: Hay, 1 ton 650 pounds; corn, 4 tons 200 pounds; roots, 12 tons 957 pounds; oats, 31 bushels 26 pounds.

COST OF PRODUCTION.

The following table gives the yields and costs of producing corn and turnips.

Cost of Production of Corn and Turnips.

Crop.	Yield per acre.				Cost of Production.		
					Per acre.	Per ton.	Per bush.
	Tons.	Lb.	Bush.	Lb.	$ cts.	$ cts.	Cents.
Roots (Magnum Bonum)	12	957	415	57	36 39	2 94	9·73
Fodder Corn	4	200	....		21 97	5 36	....

A separate record is herewith given of the cost of production, and yields of oats, grown on the same type of soil, but following roots and pasture, respectively. With the exception of a light dressing of manure to the hoed area, the cultural preparatory work was the same for both. The results are decidedly in favour of the crops following roots, both grain and the following hay crop yielding nearly double the quantity of higher quality hay than that grown on the area in pasture previously.

These observations, which are more striking in seasons of extreme drought, illustrate the importance of a proper sequence of crops, and thorough cultivation whereby not only the immediate crop is benefited but also those that follow.

Cost of Production of Oats.

Crop.	Yield per acre.		Cost of Production.	
			Per acre.	Per bush.
	Bush.	Lb.	$ cts.	Cents.
Oats (after hoed crop)	73	29	18 30	24·75
Oats (after pasture)	36	2	15 30	42·50

ROTATION OF CROPS.

An important work at this Station consists of experiments with rotations considered suitable for dairy farms. The object is to ascertain the relative value of the different rotations as soil improvers, as well as to compare the yields and profits. The crops included in the rotations are selected for the purpose of supplying a maximum amount of suitable food for milk production, and maintaining or increasing the fertility of the soil.

The following rotations are now under test, and as soon as the necessary work has been completed it will be possible to place the whole Station under regular rotation.

STE. ANNE DE LA POCATIERE.

ROTATION "A" (FIVE YEARS' DURATION).

First year.—Hoed crop of corn or roots. For corn, manure applied at rate of 25 tons per acre in spring and ploughed under. After crop is harvested, land is shallow ploughed or cultivated.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Third year.—Clover hay. Cut twice if possible.

Fourth year.—Timothy hay or pasture. Ploughed shallow in August, top-worked and re-ploughed or ridged up in late autumn.

Fifth year.—Grain. Seeded down with 10 pounds red clover which is allowed to grow to be turned under following spring, when the hoed crop is corn.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Hoed crop of corn or roots.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike and 12 pounds timothy per acre.

Third year.—Clover hay. Cut twice if possible.

Fourth year.—Timothy hay. Field ploughed shallow in August, top-worked and re-ploughed or ridged up in late autumn.

ROTATION "D" (THREE YEARS' DURATION).

First year.—Hoed crop of corn or roots. For corn, land is manured, 15 tons per acre, and ploughed in spring; for roots it is manured and ploughed in fall.

Second year.—Grain. Seeded down with 10 pounds red clover, 2 pounds alsike, 6 pounds alfalfa and 6 pounds timothy per acre.

Third year.—Clover hay. Cut twice if possible.

In order to compare the results obtained in the various rotations each year, as well as one year with another, fixed values are used. These are outlined on page 182 of this report.

DESTRUCTION OF COUCH GRASS.

An old meadow with a clay soil infested with couch grass was selected for an experiment in the eradication of this persistent weed. This field, which has an area of 2 acres, was ploughed on August 13 and cross-rolled immediately afterwards. By September there was a strong growth of couch grass which was disced with the cut-away disc and left until the spring of 1914. It was then well cultivated, and it was decided to summer-fallow one-twentieth acre and to sow a smothering crop of buckwheat on the remainder. A second cultivation was given before sowing the buckwheat on June 20. The buckwheat germinated slowly but well, while the couch grass also grew apace, and on August 1 the latter was so thick that the buckwheat was smothered on the larger part of the field.

The check or summer-fallow plot was worked with the disc harrow and cultivator on June 30 and July 7, 13, 20 and 29. By August 18 this area was free from all weeds, including couch grass, on which date the whole field was ploughed, the buckwheat being in the flowering stage of its growth.

STE. ANNE DE LA POCATIERE.

Due to the drought the buckwheat was rather short, while on the other hand this weather condition aided the destruction of the couch grass on the summer-fallow area, with the result that the summer-fallow had an advantage over the smothering crop for the destruction of weeds. However, it must not be concluded that it is always superior to a smothering crop, for under other conditions the smothering crop might have controlled the weed more efficiently and, at the same time would add humus to the soil when ploughed under.

Comparing these methods of controlling couch grass to that of using hoed crops, the conclusion has been reached that the latter, well managed and included in a suitable rotation of crops, will give as satisfactory results and provide a profitable crop.

DRAINAGE.

Eighteen thousand feet of tile drains were installed during the season. These drains, composed of 3-inch tile, were laid at the average depth of 3 feet 2 inches. Several hundred feet of main drains were laid at depths varying from 5 to 6 feet in order to obtain the necessary fall.

IMPROVEMENTS.

Over 900 rods of wire fence were constructed, good cedar posts which had received two coats of paint being used. A large number of big stones were broken with dynamite, and these, together with many small ones, were removed from the various fields. Six acres of new land were stumped and partially cleared of stone during the season.

EXPERIMENTAL STATION FOR CENTRAL QUEBEC, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, G. A. LANGELIER.

THE SEASON.

The main feature about 1914 is the drought, which lasted all through July and until August 11. This cut down the yield of hay and the stock-carrying capacity of pastures very much. Corn, which is grown only for ensilage in this district, did very well and was much better than for the last three years. Carrots, mangels, and sugar beets seemed to suffer from the lack of rain in the earlier part of the season, and germination was very poor. Swedes, as is usual in this district, forged ahead during the warm days and cool nights of September and October, and the crop was a little better than usual, though bad weather increased very much the cost of lifting and storing them. The grain, with over half an inch of rain during the latter part of May, started very well, and what was sown early escaped the bad effects of the weather of middle summer. As the acreage of corn for silage and of roots is small in central Quebec, and with the very small crop of hay, it may be said that roughage will be very scarce and high in price. The last frost, 29·2°, occurred on May 17, though the thermometer fell to 32·2° on June 2, and the first one, in the autumn, was on September 29, when 27·2° was registered. The highest temperature was on August 11, 92°, and the lowest, exactly six months before, on February 11, –30·7°.

SOME Weather Observations taken at Cap Rouge, 1914.

Month.	Temperature F.			Precipitation.				Total. Sunshine
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	43	−24·8	7·07	0·03	34·0	3·43	·60	57·5
February	33	−30·7	− ·84	....	32·6	3·26	·80	106·1
March	45	− 2·1	23·7	0·35	26·3	2·98	·70	125·4
April	54	6·2	30·12	1·19	6·8	1·87	·70	145·1
May	86	26·2	52·7	1·56	....	1·56	·50	239·7
June	86	32·2	56·36	3·28	....	3·28	·71	223·0
July	89	45·2	64·5	1·66	....	1·66	·58	279·8
August	92	40·2	61·9	4·43	....	4·43	·73	218·1
September	84	27·2	55·8	4·92	....	4·92	1·13	175·5
October	69	24·2	44·4	5·24	1·4	5·38	1·59	108·0
November	52	− 1·1	25·39	2·62	23·1	4·93	1·18	53·9
December	44	−22·8	13·7	0·68	19·2	2·60	·50	76·3
Total for year				25·96	143·4	40·30	....	1,808·4
Average for three years				30·82	130·3	43·85	....	1,671·4
Total for six months, May to October				21·09	1·4	21·23	....	1,244·1
Average of three years for six growing months, May to October				23·55	·5	23·60	....	1,121·2

TOTALS FOR YEARS 1912–14.

Rainfall. Inches.	Snowfall. Inches.	Total Precipitation. Inches.	Sunshine. Inches.
92·46	390·8	131·54	5,014·3

TOTAL FOR SIX MONTHS, MAY TO OCTOBER, 1912–13–14

Rainfall. Inches.	Snowfall. Inches.	Total Precipitation. Inches.	Sunshine. Inches.
70·64	1·4	70·78	3,363·7

CAP ROUGE.

CROP YIELDS.

All crops yielded above the average, with the exception of hay, which gave about 40 per cent less than usual, on account of the drought of the middle of summer.

FIELD CROPS, Areas and Yields, Cap Rouge, 1914.

Crop.	Variety.	Acreage.	Total yield.	Yield per acre.
			Lb.	
Corn	Longfellow	17 35	349,652	10 tons 153 lb.
Turnips	Good Luck	10·80	309,643	14 " 671 "
Oats	Banner	14·68	31,560	63 bush. 8 "
Wheat	Huron	1·78	3,530	33 " 3 "
Barley	Manchurian	1·96	1,975	21 " 0 "
Peas	Arthur Selected	2.69	4,075	25 " 15 "
Hay	Clover	19·37	55,019	1 ton 840 "
"	Timothy	12·03	34,717	1 " 894 "

The varieties named above are the ones which, at present, seem the best adapted to this region.

COST OF PRODUCTION OF FIELD CROPS.

Accurate records were kept of the cost of production of three of the main crops of this district, turnips, oats and hay, on 13 acres of land.

COST of Production of Field Crops, Cap Rouge, 1914.

Crop.	Variety.	Area.	Yield per acre.				Cost per ton.		Cost per bushel.
		Acres.	Tons.	Lb.	Bush.	Lb.	$	cts.	cents.
Turnips	Good Luck	3	17	1973			2	18	
Oats	Banner	3			69	29			33
Hay	Clover & Timothy	7	2	326			5	86	

In calculating the above, the values as outlined on page 182 have been used.

CAP ROUGE.

ROTATION OF CROPS.

A good rotation must not only give an immediate profit but should be a weed destroyer and an improver of fertility; in choosing it, a person will also take the one best adapted to the production of roughage and concentrates, according to his particular needs.

The following rotations, started in 1911, have been continued this year:—

ROTATION "D" (THREE YEARS' DURATION).

First year.—Swedes. Twelve tons barnyard manure per acre.

Second year.—Oats. Seeded down with 6 pounds timothy, 10 pounds red clover and 3 pounds alsike per acre.

Third year.—Hay. Cut early and again cut late if possible.

ROTATION "C" (FOUR YEARS' DURATION).

First year.—Swedes. Sixteen tons barnyard manure per acre.

Second year.—Oats. Seeded down with 12 pounds timothy, 8 pounds red clover and 2 pounds alsike per acre.

Third year.—Hay.

Fourth year.—Hay.

ROTATION "K" (SIX YEARS' DURATION).

First year.—Swedes. Twenty-four tons barnyard manure per acre.

Second year.—Oats. Seeded down with 12 pounds timothy, 8 pounds red clover and 2 pounds alsike per acre.

Third year.—Hay.

Fourth year.—Hay.

Fifth year.—Hay.

Sixth year.—Hay.

The details of costs, returns, profits or losses are given in the following tables:—

CAP ROUGE.

ROTATION "D"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual Labour. Hours.	Manual Labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
3rd...	Oats..........	Hay..........	1	7 00	S.3 32 M. 60	2	34	.5	3	......	......	......
1st...	Hay..........	Swedes........	1	7 00	S.1 30 M. 60	73	12 41	25·	29	6	......	......
2nd...	Swedes........	Oats..........	1	7 00	S.1 00 T. 25 M. 60	16	2 72	2·	16	3	......	......
	Aggregate....................		3	21 00	7 67	91	15 47	27·5	48	9	......	......
	Average per acre 1914..........		......	7 00	2 56	30·33	5 16	9·2	16	3	......	......

ROTATION "C" (Four years' duration).

Rotation Year.	1913.	1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual Hours.	Manual Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
2nd...	Swedes........	Oats..........	1	7 00	S.1·00 T. 25 M. 60	17	2 89	1	14	6	......	......
3rd...	Oats..........	Hay..........	1	7 00	S.1 63 M. 60	4	68	1·5	3	......	......	......
4th...	Hay..........	Hay..........	1	7 00	S.1 63 M. 60	4	68	1·5	3	......	......	......
1st...	Hay..........	Swedes........	1	7 00	S.1 30 M. 60	60	10 20	21	29	6	......	......
	Aggregate....................		4	28 00	8 21	85	14 45	25	49	12	......	......
	Average per acre 1914..........		......	7 00	2 05	21	3 61	6	12	3	......	......

ROTATION "K" (six years' duration).

Rotation Year.	1913.	1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual Hours.	Manual Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
6th...	Hay..........	Hay..........	1	7 00	S. 82 M. 60	2	34	·5	2	......	......	......
1st...	Hay..........	Swedes........	1	7 00	S.1 30 M. 60	74·5	12 66	24	29	6	......	......
2nd...	Swedes........	Oats..........	1	7 00	S.1 00 T. 25 M. 60	17	2 89	1	14	6	......	......
3rd...	Oats..........	Hay..........	1	7 00	S. 82 M. 60	3	51	1·5	3	......	......	......
4th ..	Hay..........	Hay..........	1	7 00	S. 82 M. 60	5	85	1·5	3	......	......	......
5th...	Hay..........	Hay..........	1	7 00	S. 82 M. 60	3	51	1·5	3	......	......	......
	Aggregate....................		6	42 00	9 43	104·5	17 76	30	54	12	......	......
	Average per acre 1914..........		......	7 00	1 57	17·4	2 96	5	9	2	......	......

The cost values are the same as those enumerated on page 182 of this report. The return values are $2 per ton for turnips, 1 cent per pound for oats, $4 per ton for straw and $7 per ton for hay.

CAP ROUGE.

(three years' duration) HOED CROP—GRAIN—HAY.

in Raising Crops.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of Stubble.	Grain.	Straw.	Hay.	Hoed Crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Inch.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
1 15	......	12 41	12 41	......	20 77	......	......	......	1,195	......	4 18	4 18	− 8 23
19 07	......	40 38	40 38	......	1 98	......	......	......	......	40,775	40 77	40 77	39
7 21	4 38	23 16	23 16	37	......	3·6	2,120	2,765	......	......	26 73	26 73	3 57
27 43	4 38	75 95	......	......	......	......	......	......	......	......	71 68	......	......
9 14	1 46	......	25 32	......	......	......	......	......	......	......	......	23 89	− 1 42
HOED CROP, GRAIN, HAY, HAY OR PASTURE.													
7 49	3 06	22 29	22 29	29	......	3·4	2,575	2,645	......	......	31 04	31 04	8 75
1 42	......	11 33	11 33	......	5 04	......	......	......	4,500	......	15 75	15 75	4 42
1 42	......	11 33	11 33	......	4 99	......	......	......	4,540	......	15 89	15 89	4 56
17 99	......	37 09	37 09	......	2 47	......	......	......	......	29,990	29 99	29 99	− 7 10
28 32	3 06	82 04	......	......	......	......	......	......	......	......	92 67	......	......
7 08	76	......	20 51	......	......	......	......	......	......	......	......	23 17	2 66
HOED CROP, GRAIN, HAY, HAY, HAY OR PASTURE, HAY OR PASTURE.													
82	......	9 58	9 58	......	7 17	......	......	......	2,670	......	9 34	9 34	− 24
18 80	......	40 36	40 36	......	2 17	......	......	......	......	37,155	37 15	37 15	− 3 21
7 49	3 98	23 21	23 21	32	......	3·7	2,430	2,735	......	......	29 77	29 77	6 56
1 42	......	10 35	10 35	......	5 01	......	......	......	4,130	......	14 45	14 45	4 10
1 42	......	10 69	10 69	......	4 43	......	......	......	4,825	......	16 89	16 89	6 20
1 42	......	10 35	10 35	......	5 05	......	......	......	4,095	......	14 33	14 33	3 98
31 38	3 98	104 54	......	......	......	......	......	......	......	......	121 93	......	......
5 23	66	......	17 42	......	......	......	......	......	......	......	......	20 32	2 90

ROTATIONS.—Costs, Returns, Profits or Losses, Cap Rouge, 1914.

Rotation.	Cost per acre.	Return per acre.	Profit or loss per acre.
	$ cts.	$ cts.	$ cts.
"D" (three years' duration)	25 32	23 89	1 43
"C" (four years' duration)	20 51	23 17	2 66
"K" (six years' duration)	17 42	20 32	2 90

It is too early yet to see which of the above rotations, with the fixed cost and return values set for them, will give the most profit, but the following table shows that a systematic rotation of crops will pay:—

RETURNS from Rotations "D," "C," "K," Cap Rouge, 1911-14.

	"D" 3 years.	"C" 4 years.	"K" 6 years.
	$ cts.	$ cts.	$ cts.
Returns per acre, 1914	23 89	23 17	20 32
Returns per acre, 1911	16 80	12 67	15 58
Increase in four years	7 09	10 50	4 74
Percentage of increase	42	83	30

Total cost per acre, for all three rotations, 1914............ $21 08
" " " 1911............ 21 00

It is interesting to note that the returns increased from 30 to 83 per cent, whilst the cost did not increase by 1 per cent.

PLANTING FODDER CORN IN DRILLS AND HILLS.

Since 1911, inclusively, all the corn (Longfellow) grown for silage on 39·46 acres was weighed. The following table gives details:—

CORN for Ensilage Planted in Drills and Hills, Cap Rouge, 1914.

Method of Planting.	Yield 1914.	Average Yield 4 yrs.
	Tons.	Tons.
In drills 48 inches apart, 8 inches between plants	17·62	11·58
In drills 42 inches apart, 8 inches between plants	11·95	10·76
In hills 42 inches apart	5·67	5·52
In hills, 36 inches apart	4·67	5·00
Average	10·08	8·32

RATES OF SEEDING OATS

Twenty-six plots of one-sixtieth acre were used in 1913 and in 1914, the experiment being duplicated for each quantity sown, which was from 1 to 4 bushels per acre, increasing by quarters of a bushel.

It is interesting to note that on sandy loam soil, in this district, a rather heavy seeding is required, as the average yield from all quantites of seed below 2½ bushels per acre is 1,681 pounds, whilst it was 2,040 pounds when the quantity of seed was over this amount.

RATES OF SEEDING CLOVER AND TIMOTHY.

In 1912 and 1913, forty-four plots of one-sixtieth acre each were used. Half of them were seeded with 12 pounds of timothy, 8 pounds of red clover and 2 pounds of alsike per acre, and the others with half of this quantity. Oats were used as a nurse crop. The full seeding gave an average of 2,191 pounds of hay per acre, and the half seeding 2,040 pounds.

YIELD OF HAY WHEN NURSE CROP IS SOWN AT DIFFERENT RATES.

In 1912 and 1913, forty-eight plots of one-sixtieth acre each were used, oats being sown at from 1 to 4 bushels per acre, increasing by quarters of a bushel, and seeded down with 12 pounds timothy, 8 pounds red clover and 2 pounds alsike per acre. The most noteworthy thing about the results is that there was 24 per cent more hay, on an average, from the plots where less than 2½ bushels of oats were used as a nurse crop than on the plots where more than this quantity was sown.

YIELD OF HAY WITH DIFFERENT NURSE CROPS.

It will be seen from the above that the heavy seeding of oats produced more grain, but less hay the following year. An experiment was started in 1912 and continued in 1913, when all the trial plots of cereals were seeded down with a mixture containing 12 pounds timothy, 8 pounds red clover, and 2 pounds alsike per acre. The following table shows that oats is not as good a nurse crop as peas, barley, or wheat:—

Kind of grain.	Number tried in 1912.	Yield of hay per acre in 1913.	Number tried in 1913.	Yield of hay per acre in 1914.	Average yield per acre for 1913 and 1914
		Lb.		Lb.	Lb.
Peas	10	4,920	6	2,650	3,785
Barley	13	4,740	7	2,057	3,398
Wheat	14	4,320	15	1,968	3,144
Oats	12	2,660	10	1,488	2,074

Cap Rouge.

EXPERIMENTAL FARM FOR MANITOBA, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

THE SEASON.

The season of 1914 has been the least favourable for farm crops at Brandon for a considerable number of years. The opening of spring was about normal, and farm operations were possible on April 13. After a few days of good weather, a cold spell with some showers followed, and seeding was somewhat delayed. Some of the dryer fields were soon fit again, but others were not ready until nearly the middle of May. Following this came a period of favourable weather, and by July 1, prospects were very good. However, a dry period had set in early in June, and early in July crops began to suffer for want of moisture. Then followed a month in which the previous heat record of the Farm was far surpassed. On only six days during July did the maximum temperature not exceed 80°, and on many days it exceeded 90°. The first half of August was very similar. Combined with this heat were several spells of strong wind and a very low rainfall. The result was that crops were hastened to maturity without filling properly, and yields were reduced to about two-thirds of what indications of the first of July appeared to promise.

Threshing weather was very favourable for that operation, and the crop was harvested without loss.

The hay crop had obtained a good start during the moist weather of spring and was past injury when the heat came. A good first cutting was harvested, but there was practically no aftermath except of alfalfa and it was less than usual. New seeding of grasses and clovers did very poorly and looked like a failure at harvest time. Late rains did much to revive them, and by freeze-up a fair catch was showing.

The corn and root crop suffered much from the drought, and was much below average. Turnips were benefited by September showers, and improved greatly in the last month of growth. These showers also helped fall ploughing. A long open fall gave an unusually fine opportunity for getting farm operations finished up.

WEATHER Observations taken at Brandon Experimental Farm, 1914.

Month.	Temperature F.			Precipitation.			Heaviest in 24 hours.	Total sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.		
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	2·4	38	—37·6	....	16	1·60	·50	73·5
February	—9·9	37·9	—46·4	....	3	·30	·20	134·2
March	19·2	44·9	—20·8	....	1	·10	....	114
April	35·9	69·9	5·8	2·32	2	2·52	1·35	141·6
May	45·6	80·4	19·8	2·28	....	2·28	·94	196·1
June	57·6	88·2	31·5	2·38	....	2·38	·91	179·6
July	70·3	101·5	42·5	1·91	....	1·91	·73	267·1
August	62·5	102	29	1·02	....	1·02	·30	239
September	55·1	87	26·6	2·45	....	2·45	·71	208·9
October	47	82·5	13·5	1·54	....	1·54	·78	157·8
November	22·1	61·6	-27·8	·03	7	·73	·40	104·3
December	2·7	32·5	—31·8	....	1	·10	....	82·4
Total for year	....	....	....	13·93	30	16·93	....	1898·5
Average for ten years				13·46	46·82	18·14	....	2010·5
Total for six growing months, April to September, 1914				....	....	12·56	....	1232·3
Average of ten years for six growing months, April to September				....	....	13·12	....	1300·0

The principal farm operations were begun and finished on the following dates:—

	Began.		Finished.	
Work on land	April	13		
Seeding wheat	"	14	May	13
" oats	"	15	"	16
" flax	"	28	April	28
" barley	May	13	May	21
" clovers and grasses	April	15	"	15
" alfalfa	May	29	June	1
" corn	"	21	May	23
" field roots	"	9	"	9
Cutting alfalfa, first crop	June	23	June	30
" " second crop	July	24	August	3
" other hay crops	"	3	July	22
" wheat	August	3	August	12
" oats	"	6	"	13
" barley	July	28	"	12
" flax	August	1	"	1
" corn	September	4	September	11
Threshing	August	17	"	2
Putting corn in silo	September	11	"	15
Harvesting mangels	"	26	"	27
Harvesting turnips	October	20	October	23
Ploughing for summer-fallow	June	13	June	29
Ploughing sod	"	29	August	22
Fall ploughing (stubble)	August	25	October	24
Cultivating for summer-fallow	June	15	"	24
Cultivating and hoeing corn and roots	"	10	August	6
"Freeze-up"	....		November	13

BRANDON.

CROP YIELDS.

The following is the list of the field crops for 1914. This list includes the rotation fields, but not the small test plots. Pasture and summer-fallow are not included.

FIELD CROP Areas and Yields, Brandon, 1914.

Crop.	Preceding Crop.	Area.	Yield Yield.		Yield per acre.	
		Acres.	Bush.	Lb.	Bush.	Lb.
Wheat Red Fife	Summer-fallow (Rotation D.)	3·5	85	30	24	17
" Red Fife	Summer-fallow (" E)	3·5	83	30	23	43
" Red Fife	Wheat (" D)	3·5	52	..	14	54
" Red Fife	Wheat (" E)	3·5	54	..	15	43
" Red Fife	Clover (" F)	8·5	230	..	27	4
" Red Fife	Wheat (" F)	8·5	177	..	20	49
" Red Fife	Summer-fallow	6	176	..	29	20
" Red Fife	Corn. (Rotation G)	6	186	..	31	..
" Red Fife	Pasture (" H)	4·5	146	..	32	27
" Red Fife	Wheat (" H)	4·5	116	..	25	43
" Red Fife	Summer-fallow(" I)	4·5	146		32	27
" Marquis	Alfalfa (" W)	3·83	169	..	44	8
Oats Banner	Flax (" I)	4·5	265	..	58	30
" Banner	Summer-fallow (" H)	4·5	227	..	50	15
" Banner	Corn (" W)	2·72	185	..	67	·22
" Banner	Peas (" Q)	5	77	..	15	14
" Banner	Brome sod, broken, and backset	2	79	..	39	17
" Banner	Oats	11·5	530	..	46	30
" Banner	Summer-fallow	1·5	89	..	59	11
Oats Daubeney	Summer-fallow	2	89	..	44	17
Barley O.A.C. No. 21	Corn (Rotation F)	5·5	153	..	27	39
" Manchurian	Corn (" F)	3	74	..	24	32
" Manchurian	Wheat (" G)	6	230	..	38	16
" Manchurian	Barley	3	90	..	30	00
" Manchurian	Corn	1	29	..	29	00
" Success	Oats (Rotation W)	2·9	48	..	16	18
Pease Arthur	Brome sod, broken, and backset	1	8	..	8	..
Flax Common	Pasture (Rotation I)	4·5	33	..	7	19
			Tons	Lb.	Tons	Lb.
Corn North Western Dent	Wheat (Rotation F)	8·5	87	985	10	586
" North Western Dent	Pasture (Rotation G)	4·5	35	725	7	1717
" North Western Dent	Wheat (Rotation W)	2·54	30	1295	12	132
Turnips Hall's Westbury	Oats (Rotation Q)	3	14	1760	4	1920
Hay Alfalfa	Alfalfa (Rotation W)	1·87	6	100	3	471
" Alfalfa	Alfalfa (" W)	2·4	9	465	3	1693
" Alfalfa	Alfalfa (" W)	2·16	8	830	3	1824
" Alfalfa	Alfalfa (" W)	1·55	5	795	3	964
" Alfalfa 1 cutting only	Alfalfa (" W)	1·4	3	1485	2	1061
" Alfalfa	Alfalfa	4	15	390	3	1598
" Alfalfa	Alfalfa new seeding	5	19	1025	3	1805
" Red clover	Barley (Rotation F)	8·5	15	1790	1	1740
" Red clover	Red clover	2·7	4	530	1	1159
" Mixed	Hay and Wheat	18	22	720	1	484
" Mixed	Hay	11	20	1840	1	1804
" Mixed	Barley (Rotation G)	6	10	..	1	1333
" Wild grass	Hay	7	4	..	..	1143
" Mixed	Oats (Rotation Q)	5	5	..	1	..
" Mixed	Hay (Rotation Q)	5	4	1580	..	1916
" Green Oats	Wheat (Rotation D)	3·5	6	..	1	1429
" Green oats	Wheat (Rotation E)	3·5	5	500	1	1000

BRANDON.

COST OF PRODUCTION OF FIELD CROPS.

The records in connection with the experiments in rotation of crops give an excellent opportunity for obtaining information on the cost of producing the different kinds of field crops. The values used in arriving at the items of cost are those arbitrarily set for all the rotation work on the western Experimental Farms. These are given in detail in another part of this report. It will be observed that all items of cost are considered, including rent, use of machinery, and labour of both men and horses.

The four fields of wheat reported upon herewith are all on similar soil, *i.e.*, a heavy clay loam. Except for the difference entailed by the different preceding crops, these fields were handled as nearly alike as practicable. The amount of work applied was what was considered enough for good results yet not more than what was practicable and desirable.

WHEAT ON SUMMER-FALLOW.

Number of acres, 4½.
Preceding crops: Peas, oats, summer-fallow.
Items of cost:—

Rent of land, 4½ acres, 2 years at $2 per acre.. .. .. $	18 00
Ploughing previous June, man and 4 horses 15 hours at 48 cents per hour	7 20
Packing, man and 4 horses, 3½ hours at 48 cents per hour..	1 68
Cultivating, man and 4 horses, 29½ hours at 48 cents per hour.. ..	14 16
Harrowing, man and 2 horses, 18 hours at 34 cents per hour.. ..	6 12
Seeding, man and 2 horses, 4½ hours at 34 cents per hour..	1 53
Packing, man and 4 horses, 2½ hours at 48 cents per hour..	1 20
Binding, man and 3 horses, 4½ hours at 41 cents per hour..	1 86
Stooking, man, 5 hours at 19 cents per hour..	95
Threshing, 146 bushels at 7 cents per bushel..	10 22
Use of machinery, 4½ acres, 2 years at 60 cents per acre..	5 40
Seed, 4½ acres at $1.50 per acre..	6 75
Twine..	3 45
Total cost for 4½ acres.. .. .. $	78 52

Total yield for 4½ acres, 146 bushels.
Yield per acre, 32 bushels, 21 pounds.
Cost per acre, $17.55.
Cost per bushel, 54 cents.

WHEAT FOLLOWING CORN.

Number of acres, 6.
Preceding crops: Oats, hay, pasture, corn.
Items of cost—

Rent, 6 acres at $2 per acre.. .. .. $	12 00
Manure, one-sixth share of 8 tons per acre at $1 per ton..	8 00
Harrowing, man and 2 horses, 3 hours at 34 cents per hour..	1 02
Seeding, man and 2 horses, 6 hours at 34 cents per hour..	2 04
Binding, man and 3 horses, 7 hours at 41 cents per hour..	2 87
Stooking, man, 12 hours at 19 cents per hour..	2 28
Threshing, 186 bushels at 7 cents per bushel..	13 02
Use of machinery, 6 acres at 60 cents per acre..	3 60
Seed, 6 acres at $1.50 per acre..	9 00
Twine..	4 20
Total cost for 6 acres.. .. .. $	58 03

Total yield for 6 acres, 186 bushels.
Yield per acre, 31 bushels.
Cost per acre, $9.67.
Cost per bushel, 31 cents.

COST OF PRODUCTION OF FIELD CROPS—*Continued.*

WHEAT FOLLOWING WHEAT.

Number of acres, 4½.
Preceding crops: Hay, pasture, wheat.
Items of cost—

Rent 4½ acres at $2 per acre	$9 00
Manure, one-sixth share of 6 tons per acre at $1 per ton	4 50
Ploughing in October, man and 4 horses, 15 hours at 48 cents per hour	7 20
Discing in spring, man and 2 horses, 9 hours at 34 cents per hour	3 06
Harrowing, man and 2 horses, 11½ hours at 34 cents per hour	3 91
Seeding, man and 2 horses, 4 hours at 34 cents per hour	1 36
Binding, man and 3 horses, 4½ hours at 41 cents per hour	1 86
Stooking, man, 5 hours at 19 cents per hour	95
Threshing, 116 bushels at 7 cents per bushel	8 12
Use of machinery, 4½ acres at 60 cents per acre	2 70
Seed, 4½ acres at $1.50 per acre	6 75
Twine	2 10
Total cost for 4½ acres	$51 51

Total yield for 4½ acres, 116 bushels.
Yield per acre, 25 bushels 43 pounds.
Cost per acre, $11.44.
Cost per bushel, 44 cents.

WHEAT ON SOD LAND.

Number of acres, 4½.
Preceding crops: Oats, hay, pasture.
Items of cost—

Rent, 4½ acres at $2 per acre	$9 00
Manure, one-sixth share of 6 tons per acre at $1 per ton	4 50
Ploughing in summer, man and 4 horses, 18 hours at 48 cents per hour	8 64
Discing, man and 2 horses, 13½ hours at 34 cents per hour	4 59
Harrowing, man and 2 horses, 5½ hours at 34 cents per hour	1 87
Seeding, man and 2 horses, 4½ hours at 34 cents per hour	1 53
Binding, man and 3 horses, 5 hours at 41 cents per hour	2 05
Stooking, man, 6 hours at 19 cents per hour	1 14
Threshing, 146 bushels at 7 cents per bushel	10 22
Use of machinery, 4½ acres at 60 cents per acre	2 70
Seed, 4½ acres at $1.50	6 75
Twine	3 30
Total cost for 4½ acres	$56 29

Total yield for 4½ acres, 146 bushels.
Yield, per acre, 32 bushels 27 pounds.
Cost, per acre, $12.51.
Cost, per bushel, 39 cents.

COST OF PRODUCING OATS.

Oats on Flax Land.

Number of acres, 4½.
Preceding crops: Hay, pasture, flax.
Items of cost—

Rent, 4½ acres at $2 per acre	$ 9 00
Manure, one-sixth share of six tons per acre at $1 per ton	4 50
Ploughing in October, man and 4 horses, 15 hours at 48 cents per hour	7 20
Discing, man and 2 horses, 9 hours at 34 cents per hour	3 06
Harrowing, man and 2 horses, 11½ hours at 34 cents per hour	3 91
Seeding, man and 2 horses, 4 hours at 34 cents per hour	1 36
Binding, man and 3 horses 3½ hours at 41 cents per hour	1 45
Stooking, man, 6 hours at 19 cents per hour	1 14
Threshing, 265 bushels at 4 cents per bushel	10 60
Use of machinery, 4½ acres at 60 cents per acre	2 70
Seed, 4½ acres at $1 per acre	4 50
Twine	2 55
Total cost for 4½ acres	$ 51 97

Total yield for 4½ acres, 265 bushels.
Yield per acre, 58 bushels, 30 pounds.
Cost per acre, $11.55.
Cost per bushel, 20 cents.

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COST OF PRODUCTION OF FIELD CROPS—*Continued.*

Oats on Corn Land.

Number of acres, 2·72.
Preceding crops: Wheat, summer-fallow, corn.
Items of cost—

Rent, 2·72 acres at $2 per acre.. .. ..$	5 44
Raking off corn trash, man and 2 horses, 4½ hours at 34 cents per hour..	1 53
Harrowing, man and 2 horses, 3 hours at 34 cents per hour..	1 02
Seeding, man and 2 horses, 3 hours at 34 cents per hour..	1 02
Binding, man and 3 horses, 4 hours at 41 cents per hour..	1 64
Stooking, man, 6 hours at 19 cents per hour..	1 14
Threshing, 185 bushels at 4 cents per bushel..	7 40
Use of machinery, 2·72 acres at 60 cents per acre..	1 63
Seed, 2·72 acres at $1 per acre..	2 72
Twine..	1 35
Total cost for 2·72 acres.. .. ..$	24 89

Total yield for 2·72 acres, 185 bushels.
Yield per acre, 67 bushels, 22 pounds.
Cost per acre, $9.15.
Cost per bushel, 13½ cents.

COST OF PRODUCING BARLEY.

Barley suffered the most severely of any grain crop during the drought and heat. Consequently yields are lower and cost of production per bushel higher than normal.

Barley following Oats and Wheat.

Number of acres, 6.
Preceding crops: Corn, wheat, oats.
Items of cost—

Rent, 6 acres at $2 per acre.. .. ..$	12 00
Manure, one-sixth share of 8 tons per acre at $1 per ton..	8 00
Ploughing, man and 4 horses, 18 hours at 48 cents per hour.. ..	9 12
Discing and harrowing, man and 2 horses, 25 hours at 34 cents per hour..	8 50
Seeding, man and 2 horses, 6 hours at 34 cents per hour..	2 04
Binding, man and 3 horses, 7 hours at 41 cents per hour..	2 87
Stooking, man, 13 hours at 19 cents per hour..	2 47
Threshing, 230 bushels at 5 cents per bushel..	11 50
Use of machinery, 6 acres at 60 cents per acre..	3 60
Seed, 6 acres at $1 per acre..	6 00
Twine..	2 70
Total cost for 6 acres.. .. ..$	68 80

Total yield from 6 acres, 230 bushels.
Yield per acre, 38 bushels, 16 pounds.
Cost per acre, $11.47.
Cost per bushel, 30 cents.

COST OF PRODUCTION OF FIELD CROPS—*Concluded.*

COST OF PRODUCING CORN ENSILAGE.

Corn following Wheat.

Number of acres, 8½.
Preceding crops: Summer-fallow, wheat, wheat.
Items of cost—

Rent, 8½ acres at $2 per acre	$17 00
Manure, one-fifth share of 6 tons per acre at $1 per ton	10 20
Ploughing in October, man and 4 horses, 25 hours at 48 cents per hour	12 00
Discing and harrowing, man and 2 horses, 21 hours at 34 cents per hour	7 14
Rolling, man and 2 horses, 3 hours at 34 cents per hour	1 02
Seeding, man and 2 horses, 11½ hours at 34 cents per hour	3 91
Cultivating, man and 2 horses, 30 hours at 34 cents per hour	10 20
Cultivating, man and 1 horse, 31½ hours at 27 cents per hour	8 51
Hoeing, men, 204 hours at 19 cents per hour	38 76
Cutting corn, man and 2 horses, 17 hours at 34 cents per hour	5 78
Filling silo, 87½ tons at 65 cents per ton	56 88
Use of machinery, 8½ acres at 60 cents per acre	5 10
Seed, 8½ acres at 65 cents per acre	5 53
Twine	6 10
Total cost for 8½ acres	$188 13

Total yield from 8½ acres, 87½ tons.
Yield per acre, 10 tons 586 pounds.
Cost per acre, $22.13.
Cost per ton, $2.15.

COST OF PRODUCING ALFALFA HAY.

Number of acres, 2·4.
Preceding crop: Alfalfa for three previous years.
Items of cost—

Rent, 2·4 acres at $2 per acre	$4 80
One-fifth share of rent and labour of seed-down season	4 80
Cutting and raking, man and 2 horses, 3 hours at 34 cents per hour	1 02
Tedding, man and 1 horse, 2 hours at 27 cents per hour	54
Coiling, man, 7 hours at 19 cents per hour	1 33
Drawing in, man and 2 horses, 16½ hours at 34 cents per hour	5 61
Loading and unloading, men, 15 hours at 19 cents per hour	2 85
Cutting and raking second crop, man and 2 horses, 4 hours at 34 cents per hour	1 36
Tedding, man and one horse, 2 hours at 27 cents per hour	54
Coiling and shaking out, men, 9 hours at 19 cents per hour	1 71
Drawing in, man and 2 horses, 5 hours at 34 cents per hour	1 70
Loading and unloading, men, 4 hours at 19 cents per hour	76
Use of machinery, 2·4 acres at 60 cents per acre	1 44
Seed, one-fifth share of seed used in 1910	2 88
Total cost for 2·4 acres	$31 34

Total yield from 2·4 acres, 9 tons, 465 pounds.
Yield per acre, 3 tons, 1,693 pounds.
Cost per acre, $13.06.
Cost per ton, $3.39.

ROTATION OF CROPS.

There is a growing sentiment in the province of Manitoba in favour of increasing the number of live stock kept, growing more forage crops, and thus going in for that system of agriculture known as mixed farming. This province has long been known as a grain-growing country. It seemed specially adapted to that purpose; the great fertility of the soil, the ease with which large areas could be cultivated, and the quality of the grain produced, all tended to make wheat production the mainstay of prairie farming. Thirty years of that method have begun to bring about the inevitable result. Weeds are becoming more prevalent, fertility is beginning to fail, and soil blowing is becoming more of a difficulty each year. These difficulties are more perceptible on some farms than on others, depending on how well the land has been farmed.

The very essence of the advantage of mixed farming is that it makes possible a more scientific rotation of crops than can be practised under grain growing. By caus-

ing the various crops to follow each other in the most desirable sequence, it is possible that the fertility and cleanliness of the land may be kept up, and that each crop may leave the land in a suitable condition for its successor. In order to get definite information as to what rotations are suited to Manitoban conditions, eight different rotations are under test at this Experimental Farm.

That the results obtained in various years may be comparable, fixed valuations have been established for both labour and product. These valuations will be used from year to year, regardless of fluctuations in rates of wages and values of products. Thus in some seasons, such as 1914, the actual profits will really be greater than are shown; in others, when prices for products are low, the profits will be less. These constant values, however, permit of a fairer comparison of the different rotations, and of periods of years within a single rotation.

The following values have been fixed:—

Return Values.

Wheat (from the machine)	per lb.	1½ cents.
Barley "	"	1 cent.
Oats "	"	1 cent.
Peas "	"	1½ cents.
Flax "	"	3 cents.
Timothy hay	per ton.	$ 10 00
Red Clover hay	"	10 00
Alfalfa hay	"	12 00
Brome Grass hay	"	10 00
Western Rye Grass hay	"	10 00
Mixed hay	"	10 00
Green hay	"	10 00
Oat straw	"	2 00
Flax straw	"	2 00
Barley straw	"	2 00
Wheat straw	"	1 00
Pea straw	"	2 00
Dry corn stalks	"	5 00
Corn ensilage	"	3 00
Mangels and turnips	"	3 00
Sugar beets	"	4 00
Pasture, each horse	per month.	1 00
" cow	"	1 00
" sheep	"	25

Cost Values.

Rent	per acre.	$2 00
Barnyard manure spread on fields (charged equally over all years of the rotation)	per ton.	1 00
Seed wheat	per acre.	1 50
Seed oats	"	1 00
Seed barley	"	1 00

(All other seeds to be charged at actual cost. Cost of grass seed to be charged equally on the years producing grass. Twine charged at actual cost.)

Machinery	per acre.	·60
Manual labour	per hour.	·19
Horse labour (including teamster)—		
Single horse	per hour.	·27
Two-horse team	"	·34
Three-horse	"	·41
Four-horse team	"	·48
Additional horses	each hour.	·07

(Work done by traction engine is to be converted into the amount of horse labour required to do the work, and charged accordingly.)

Threshing (covering work from stook to granary)—		
Wheat	per bush.	·07
Oats	"	·04
Barley	"	·05
Flax	"	·12
Peas	"	·07

The eight crop rotations under test at this farm have all been under full operation this year, and interesting results have been obtained.

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ROTATION "D" (FOUR YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat, manured preceding fall at the rate of 6 tons per acre.

Third year.—Oats.

Fourth year.—Summer-fallow.

This is a typical grain-farming rotation, except that manure is applied every four years. The first crop of wheat is sown on summer-fallowed land. After the crop is harvested the land is manured in the fall and then ploughed. A second crop of wheat is then sown. The stubble is ploughed in the fall, if possible, and a crop of oats is grown the following year. The land is summer-fallowed in the fourth year, in preparation for wheat again. The soil on which this rotation is located is a black loam, varying from clayey to sandy. Operations were commenced on this rotation in 1910, and it has been in full operation ever since.

ROTATION "E" (FOUR YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Oats.

Fourth year.—Summer-fallow.

This is identically the same rotation as "D," except that no manure is applied at any time. It is the same rotation as used by many of the best grain farmers in Manitoba. The operations have been exactly the same as on "D," except for the application of manure. The land is the same as "D," each field lying contiguous to the corresponding field in "D."

One striking result already observed in rotations "D" and "E" is the great difficulty in keeping wild oats in check. The three successive grain crops give this weed a great opportunity to multiply, and the summer-fallow is not a sufficient means of checking it. This result coincides with the experience of many Manitoba farmers who find that in growing grain exclusively, the wild oats increase from year to year no matter how well the summer-fallowing is done. In the mixed-farming rotations under operation nearby, this difficulty is not experienced. In order to control the wild oats better, the oats in rotations "D" and "E" were cut for green hay this year. The results from these rotations are given in detail in the accompanying table.

ROTATION "F" (FIVE YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Corn or roots. Manured preceding fall.

Fourth year.—Oats or barley. Seeded with grass and clover.

Fifth year.—Clover hay.

Five fields of 8½ acres each are used for this rotation. After the first crop of wheat, the land is manured and fall ploughed for corn, which is kept well cultivated during the season. The barley and grass seed are sown next spring without ploughing.

As soon as the crop of hay is cut in the fifth year the land is ploughed up and given a partial summer-fallow for the balance of the season. It is then in first-class condition for the wheat of the first year.

Rotation " F " is a mixed-farming rotation suited to conditions where it is desired to grow both a considerable quantity of wheat and a large quantity of fodder for stock. It pre-supposes a sufficient area of permanent pasture outside the rotation. It eliminates the summer-fallow.

This rotation is proving a decided success on the Experimental Farm. In a country where summer-fallowing is generally considered essential, it demonstrates the possibility of producing a profitable crop every year. The substitutes for the summer-fallow are: first, corn or roots; and, secondly, clover hay. While these crops do not show in themselves any very great profit, they more than pay for the operations they involve, and for the overhead charges counted against them, and they leave the land in such a condition that the following crops of grain are more profitable than any grown in the straight grain-growing rotation. The detailed results on rotation " F " for 1914 are shown in the accompanying table.

ROTATION " G " (SIX YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Oats and barley. Seeded with grass and clover.

Fourth year.—Clover hay.

Fifth year.—Pasture.

Sixth year.—Corn or roots. Manured previous fall.

This is a mixed-farming rotation which provides for one-third of the farm in wheat, and gives a good area to different kinds of feed for live stock, including pasture. The latter necessitates the building of divisional fences between the fields.

The wheat of the first year is sown among the stubble of the corn of the sixth year, without ploughing. The trash from the corn is raked off and burned, and the land harrowed. After the first crop of wheat is harvested the land is fall ploughed for a second crop. After the second crop, it is again fall ploughed. The third crop is oats or barley, and with it is sown a mixture of 5 pounds of timothy and 8 pounds of red clover, per acre. The fourth year, there is a crop of hay, mostly clover. As soon as it is removed, the aftermath is used for pasture. The fifth year is pasture, up till about the middle of July or the first of August, when the aftermath of the hay field is ready to carry the stock. The pasture is then manured, and ploughed under. There having been only two years of grass, the sod is not hard to plough, and does not need to be backset. The sixth year is corn or roots. These are thoroughly cultivated, so that the land is left as clean as a good summer-fallow, and is ready for wheat again, without ploughing.

The land used for rotation " G " is a heavy clay loam. This rotation was the first started on the Farm, and has been in full operation several years. The results for 1914 are shown in detailed form in the accompanying table.

ROTATION " H " (SIX YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Summer-fallow.

Fourth year.—Oats. Seeded with grass and clover.

Fifth year.—Hay.

Sixth year.—Pasture. Manured in midsummer.

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This is a mixed-farming rotation, suitable for those who do not wish to grow corn or roots on a large scale. It gives one-third of the land to wheat, and one-sixth each to oats, hay and pasture. It requires divisional fences on account of the pasture. The rotation is located on heavy clay land. The land has been somewhat badly infested with couch grass, but it is now more nearly comparable with the rest of the Farm.

The first crop of wheat is sown on the sod land which has been broken the previous midsummer and manured. After fall ploughing, a second crop of wheat is sown. Then the land is summer-fallowed. Following the summer-fallow, oats are sown, and with them a mixture of grass and clover. After one year of hay and one of pasture the land is broken again for wheat, as at the first.

The detailed results from this rotation are given in the accompanying table.

ROTATION "I" (SIX YEARS' DURATION).

First year.—Flax.

Second year.—Oats.

Third year.—Summer-fallow.

Fourth year.—Wheat. Seeded with grass and clover.

Fifth year.—Hay.

Sixth year.—Pasture. Manured in midsummer.

This rotation is very similar to "H," the difference being that one crop of wheat is replaced by flax, and the position of the other crop of wheat is changed with the oats, so that the seeding down is with wheat. It occupies half of the same fields as occupied by "H," and is under the same disadvantage as regards couch grass. The results are reported in tabular form with the others.

ROTATION "Q" (EIGHT YEARS' DURATION).

First year.—Roots and peas.

Second year.—Wheat or oats. Seeded with grass and clover.

Third year.—Hay.

Fourth year.—Hay.

Fifth year.—Pasture.

Sixth year.—Pasture.

Seventh year.—Pasture.

Eighth year.—Green feed and rape. Manured in fall.

This rotation is located on a piece of poor, gravelly soil, on the high land at the rear of the Experimental Farm, It is used as a sheep farm, and the rotation is arranged accordingly. The first year is divided between peas and turnips. They are sown on land that grew green feed and rape the year before, and was manured and fall ploughed. The next year, the field is seeded down, with oats or wheat as a nurse crop. Two years of hay and three of pasture follow. In the last year of pasture, the land is ploughed in midsummer, and backset the following spring. A crop of green feed (peas and oats), and a crop of rape for pasture, are grown the last year. The land is then manured, and ploughed for the first year crops again.

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ROTATION "W" (TEN YEARS' DURATION).

First year.—Wheat.

Second year.—Wheat.

Third year.—Corn or roots. Manured.

Fourth year.—Oats.

Fifth year.—Barley.

Sixth year.—Alfalfa. Sown alone.

Seventh year.—Alfalfa.

Eighth year.—Alfalfa.

Ninth year.—Alfalfa.

Tenth year.—Alfalfa. Ploughed up in midsummer.

This is distinctly an alfalfa rotation. For the use of this crop it is necessary to have a long rotation, as the alfalfa is expensive to seed, and takes some time to reach its highest production. This rotation will be best suited to a dairy or stock farm, as half the land is under alfalfa.

The soil on which rotation "W" is used is heavy clay. The first year, wheat is sown on land upon which alfalfa has been grown for four years, and has been ploughed in midsummer after the first cutting of the last year of alfalfa has been taken off. After fall ploughing, another crop of wheat is taken off. The land is then heavily manured, and sown to corn or roots. Following the hoed crop, oats are sown, without ploughing. Following the oats, a crop of early-maturing barley is grown, and the land given a partial summer-fallow, either before the barley is sown or after it comes off. The next year, alfalfa is sown without a nurse crop. Three full years of alfalfa hay, and a first cutting of the fourth year are harvested. The land is then ploughed in midsummer, and made ready for wheat again.

This rotation is in full swing this year for the first time, and has made a remarkably good showing, as given in detail herewith.

BRANDON.

ROTATION "D"

Rotation Year.	Crops.		Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour: Hours manual labour.	Manual labour: Cost of manual labour.	Horse labour (including teamster). Hours: Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1913.	1914.	Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st....	Fallow........	Wheat.........	3·5	12 25	9 10	4	0 76	......	5½	4	2½	......
2nd...	Wheat........	Wheat.........	3·5	12 25	7 88	2½	0 48	......	11	3	11	......
3rd....	Wheat........	Oats...........	3·5	12 25	5 60	26	4 94	......	25	......	16½	......
4th....	Oats..........	Fallow.........	3·5	12 25	2 10	......	......	......	7½	......	20	......
	Aggregate......................		14	49 00	24 68	32½	6 18	......	49	7	50	......
	Average per acre..............		......	3 50	1 76	......	0 44	......	......	......	......	......

ROTATION "E"

1st....	Fallow........	Wheat.........	3·5	7 00	8 92	4	0 76	......	5½	4	2½	......
2nd...	Wheat........	Wheat.........	3·5	7 00	8 23	2½	0 48	......	11	3	11	......
3rd....	Wheat........	Oats...........	3·5	7 00	5 60	26	4·94	......	25	......	16½	......
4th....	Oats..........	Fa low.........	3·5	7 00	2 10	......	......	......	7½	......	20	......
	Aggregate......................		14	28 00	24 85	32½	6 18	......	49	7	50	......
	Average per acre..............		......	2 00	1 77	......	0 44	......	......	......	......	......

ROTATION "F"

1st....	Clover........	Wheat.........	8·5	30 60	31 45	15	2 85	......	47½	9	38	......
2nd...	Wheat........	Wheat.........	8·5	17 00	22 80	13	2 47	......	22	9	25	......
3rd....	Wheat........	Corn...........	8·5	27 20	16 73	204	38 76	31½	82½	......	25	......
4th....	Corn..........	Barley.........	8·5	30 60	16 60	10	1 90	......	26½	8	......	......
5th....	Barley........	Clover.........	8·5	30 60	31 66	56	10 64	6	52	......	......	......
	Aggregate......................		42·5	136 00	119 24	298	56 62	37½	230½	26	88	......
	Average per acre..............		......	3 20	2 81	......	1 33	......	......	......	......	......

ROTATION "G"

1st....	Corn..........	Wheat.........	6	20 00	16 80	12	2 28	......	9	7	......	......
2nd...	(No crop).....	Wheat.........	6	20 00	18 00	13	2 47	......	15	7	......	......
3rd....	Oats..........	Barley.........	6	20 00	12 30	13	2 47	......	31	7	19	......
4th....	Barley........	Clover hay.....	6	20 00	11 58	46	8 74	......	27½	......	......	......
5th....	Clover hay...	Pasture.........	6	12 00	14 55	23	4 37	......	17	......	......	......
6th....	Pasture.......	Corn...........	6	20 00	9 60	250	47 50	18	80	......	30	......
	Aggregate......................		36	112 00	82 83	357	67 83	18	179½	21	49	......
	Average per acre..............		......	3 11	2 30	......	1 89	......	......	......	......	......

BRANDON.

(four years' duration).

In raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing or silo filling.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed Crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
4 71	5 99	32 81	9 37	0 78	......	......	5,130	10,000	....	....	73 40	20 97	11 60
10 25	3 64	34 50	9 86	0 66	......	......	3,120	3,000	....	....	43 10	12 31	2 45
16 42	......	39 21	11 20	......	6 53	......	....	....	12,000	....	60 00	17 14	5 49
12 15	......	26 50	7 57	......	......	......	....	....	....	....	....	......	−7 57
43 53	9 63	133 02	......	......	......	......	....	....	....	....	176 50	......	......
3 11	0 69	......	9 50	......	......	......	....	....	....	....	....	12 61	3 11

(four years' duration).

4 71	5 85	27 24	7 78	0 69	......	......	5,010	9,000	....	....	71 30	20 37	12 59
10 25	3 78	29 74	8 50	0 55	......	......	3,240	5,000	....	....	45 70	13 06	4 56
16 4	......	33 96	9 70	......	6 47	......	....	....	10,500	....	52 50	15 00	5 30
12 15	......	21 25	6 07	......	......	......	....	....	....	....	....	......	−6 07
43 53	9 63	112 19	......	......	......	......	....	....	....	....	169 50	......	......
3 11	0 69	......	8 01	......	......	......	....	....	....	....	....	12 11	4 10

(five years' duration).

38 08	16 10	119 08	14 01	0 52	......	......	13,800	31,000	....	....	199 50	23 47	9 46
23 17	12 39	77 83	9 15	0 44	......	......	10,620	20,000	....	....	151 60	17 83	8 68
48 56	56 88	188 13	22 13	......	2 15	......	....	....	....	175,000	262 50	30 88	8 75
12 29	11 35	72 74	8 56	0 32	......	......	10,896	14,000	....	....	122 96	14 47	5 91
19 30	......	92 20	10 85	......	5 80	......	....	....	31,790	....	158 95	18 70	7 85
141 40	96 72	549 98	......	......	......	......	....	....	....	....	895 51	......	......
3 33	2 28	......	12 91	......	......	......	....	....	....	....	....	21 07	8 13

(six years' duration).

5 93	13 02	58 03	9 67	0 31	......	......	11,160	18,000	....	....	157 80	26 30	16 63
7 97	12 32	60 76	10 13	......	......	......	10,560	26,000	....	....	153 80	25 63	15 50
22 53	11 50	68 80	11 47	0 30	......	......	11,040	12,000	....	....	132 40	22 07	10 60
9 35	......	49 67	8 28	......	4 97	......	....	....	20,000	....	112 00	18 67	10 39
5 78	......	36 70	6 12	......	......	......	....	....	14,000	....	94 00	15 67	9 56
46 46	22 97	146 53	24 42	......	4 14	......	....	....	....	70,725	106 00	17 68	−6 74
98 02	59 81	420 49	......	......	......	......	....	....	....	....	756 00	......	......
2 72	1 66	......	11 68	......	......	......	....	....	....	....	....	21 00	9 32

Brandon.

ROTATION "H"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st....	Pasture.......	Wheat.........	4·5	13 50	12 75	6	1 14	.....	23½	5	18	.....
2nd...	Wheat........	Wheat.........	4·5	13 50	11 55	5	0 95	.....	24½	4½	15	.....
3rd....	(Barley)......	Fallow.........	4·5	13 50	2 70	.....	.....	.....	17	.....	39	.....
4th....	Fallow........	Oats...........	4·5	9 00	9 90	6	1 14	.....	22½	4½	2½	.....
5th....	(No crop).....	Hay...........	4·5	9 00	2 70	8	1 52	.....	7	.....	.....	.....
6th....	Hay..........	Pasture........	4·5	9 00	7 65	.....	.....	.....	.....	.....	.....	.....
	Aggregate....................		27	67 50	47 25	25	75	.....	94½	14	94½	.....
	Average per acre..............		.....	2 50	1 75	.....	0 18	.....	.....	.....	.....	.....

ROTATION "I"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st....	Pasture.......	Flax...........	4·5	13 50	8 95	7	1 33	.....	27½	.....	18	.....
2nd...	Flax..........	Oats...........	4·5	13 50	9 75	6	1 14	.....	24½	3½	15	.....
3rd....	Oats..........	Fallow.........	4·5	13 50	2 70	.....	.....	.....	17	.....	39	.....
4th....	Fallow........	Wheat.........	4·5	9 00	12 90	5	0 95	.....	22½	4½	2½	.....
5th....	(No crop).....	Hay...........	4·5	9 00	2 70	8	1 52	.....	7	.....	.....	.....
6th....	Hay..........	Pasture........	4·5	9 00	7 65	.....	.....	.....	.....	.....	.....	.....
	Aggregate....................		27	67 50	44 65	26	4 94	.....	98½	8	74½	.....
	Average per acre..............		.....	2 50	1 65	.....	0 18	.....	.....	.....	.....	.....

ROTATION "Q"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st....	Oats and rape	Turnips and fallow........	5	20 00	9 00	316	60 04	23½	38	.....	26½	.....
2nd...	Turnips & peas	Oats...........	5	20 00	8 90	4	0 76	.....	11	4	10	.....
3rd....	Oats..........	Hay...........	5	20 00	7 54	20	3 80	.....	16	.....	.....	.....
4th....	Hay..........	Hay...........	5	20 00	6 98	12	2 28	.....	13	.....	.....	.....
5th....	Hay..........	Pasture........	5	10 00	.....	.....	.....	.....	.....	.....	.....	.....
6th....	Pasture.......	Pasture........	5	10 00	.....	.....	.....	.....	.....	.....	.....	.....
7th....	Pasture.......	Pasture........	5	10 00	.....	.....	.....	.....	.....	.....	.....	.....
8th....	Pasture.......	Green feed and rape..........	5	10 00	8 00	.....	.....	.....	56½	.....	14	.....
	Aggregate....................		40	120 00	40 42	352	66 88	23½	134½	4	50½	.....
	Average per acre..............		.....	3 00	1 01	.....	1 67	.....	.....	.....	.....	.....

ROTATION "W"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st....	Alfalfa........	Wheat.........	1 73	3 46	4 99	5	0 95	.....	11½	13	8½	.....
2nd...	(Alfalfa)......	Wheat.........	2 10	4 20	6 21	6	1 14	.....	11½	13½	8½	.....
3rd....	Wheat........	Corn...........	2 54	8 13	4 97	225	42 75	4½	24½	.....	10	.....
4th....	Corn..........	Oats...........	2 72	5 44	5 70	6	1 14	.....	10½	4	.....	.....
5th....	Oats..........	Barley.........	2 90	5 80	4 09	6	1 14	.....	6	7	.....	.....
6th....	(Alfalfa)......	(Alfalfa).......	1 87	3 74	3 36	19	3 61	2½	18	.....	.....	.....
7th....	Alfalfa........	Alfalfa.........	2 40	4 80	4 32	35	6 65	4	28½	.....	.....	.....
8th....	Alfalfa........	Alfalfa.........	2 16	4 32	3 88	26½	5 04	3½	25½	.....	.....	.....
9th....	Alfalfa........	Alfalfa.........	1 55	3 10	2 79	22	4 18	2½	19	.....	.....	.....
10th..	Alfalfa........	Alfalfa.........	1 40	2 80	1 68	13	2 47	1½	12	.....	.....	.....
			21 37	45 79	41 99	363½	69 07	18½	167	37½	27	.....
			.....	2 14	1 97	.....	3 23	.....	.....	.....	.....	.....

BRANDON.

(six years' duration).

IN RAISING CROP.							PARTICULARS OF CROP.						
							Weight.						
Value of horse labour.	Cost of threshing or silo filling.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
18 68	10 22	56 29	12 51	0 39			8,760	1,400			123 80	27 51	15 00
17 39	8 12	51 51	11 44	0 44			6,960	1,000			97 80	21 73	10 29
24 50		40 70	9 04										−9 04
10 71	9 08	39 83	8 80	0 33			7,718	1,300			90 18	20 04	11 24
2 38		15 60	3 47		7 80				4,000		26 00	5 78	2 31
		16 65	3 70								24 00	5 33	1 63
73 66	27 42	220 58									361 78		
2 72	1 02		8 17									13 40	5 23
(six years' duration).													
17 99	3 96	45 73	10 16	1 39			1,848	5,000			60 44	13 43	3 27
16 98	10 60	51 97	11 55	0 20			9,010	10,000			100 10	22 25	10 70
24 50		40 70	9 04										−9 04
10 71	10 22	43 78	9 73	0 54			8,760	15,000			124 30	27 62	17 89
2 38		15 60	3 47		7 80				4,000		26 00	5 78	2 31
		16 65	3 70								24 00	5 33	1 63
72 56	24 78	214 43									334 84		
2 69	0 92		7 94									12 40	4 46
(eight years' duration).													
31 99		121 03	24 21							28,760	44 40	8 88	−15 33
10 18	3 16	43 00	8 60	0 54			2,686	4,000			30 86	6 17	−2 43
5 44		36 78	7 36		7 36				10,000		50 00	10 00	2 64
4 42		33 68	6 74		7 03				9,580		51 48	10 30	3 56
		10 00	2 00								17 25	3 45	1 45
		10 00	2 00								17 25	3 45	1 45
		10 00	2 00								15 00	3 00	1 00
25 93		43 93	8 79								35 00	7 00	−1 79
77 96	3 16	308 42									261 24		
1 95	0 08		7 71									6 53	−1 18
(ten years' duration).													
13 22	5 32	28 04	16 21	0 37			4,560	6,000			63 80	36 88	20 67
13 54	6 51	31 60	15 05	0 34			5,580	9,000			78 90	37 57	22 52
14 35	19 91	90 11	35 48		2 94					61,275	91 91	36 19	0 71
5 21	7 40	24 89	9 15	0 13½			6,290	6,000			68 90	25 33	16 18
7 04	2 40	20 47	7 06	0 43			2,306	3,000			26 04	8 98	1 92
6 80		17 51	9 36		3 51				12,100		72 60	38 82	29 46
10 77		26 54	11 06		3 39				18,465		110 79	46 16	35 10
9 62		22 86	10 58		3 39				16,830		100 98	46 75	36 17
7 14		17 21	11 10		3 77				10,795		64 77	41 78	30 68
4 71		11 66	8 33		3 77				7,485		44 91	32 08	23 75
92 50	41 54	290 89									723 60		
4 33	1 94		13 61									33 86	20 25

BRANDON.

CULTURAL EXPERIMENTS.

A comprehensive system of experiments for the purpose of investigating problems in regard to the cultivation of the soil has been inaugurated at this Farm. The plots were surveyed in 1911, and a start made at experimental work that year. The work has been continued each year since that time. Unfortunately, very little of a definite nature has been obtained in the way of results. In order to show the scope of the work being done, and to draw some few conclusions, the results obtained this year, and the averages, are presented herewith. However, these figures are not intended to be taken as definite proof of anything until a larger number of years' work has been averaged up.

DEPTH OF PLOUGHING.

In this experiment, summer-fallow ploughing was done at various depths, the land was then sown to wheat, and after the wheat to oats. The depth of ploughing of the wheat stubble for oats was the same as the depth of ploughing the summer-fallow, where the latter was less than 6 inches. Where the summer-fallow ploughing was 6 inches or more, the stubble ploughing which followed was uniformly 5 inches. The other treatment given was what was considered necessary for good cultivation, and was uniform throughout.

Depth of Ploughing Summer-fallow to be sown to Wheat followed by Oats.

Plot No.	Depth of Ploughing Summer-Fallow.	Yield of wheat after Summer-fallow.				Yield of oats second season after Summer-fallow.			
		1914.		3-year Average.		1914.		2-year Average.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Ploughing 3 inches deep	46	10	50	30	92	2	93	33
2	Ploughing 4 inches deep	47	10	50	10	92	2	93	23
3	Ploughing 5 inches deep	46	40	47	43	90	10	95	
4	Ploughing 6 inches deep	47	10	48	07	93	08	96	01
5	Ploughing 7 inches deep	44	50	47	10	92	2	95	15
6	Ploughing 8 inches deep	45	50	49	53	95	10	92	32
7	Ploughing 5 inches deep, subsoil 4 inches	44	50	44	20	92	22	97	32
8	Ploughing 6 inches deep, subsoil 4 inches	45	30	44	30	96	16	99	4
9	Ploughing 7 inches deep, subsoil 4 inches	44	30	46	43	90	30	95	
10	Ploughing 8 inches deep, subsoil 4 inches	46	10	42	57	91	16	92	32

No difference was observed in the date of ripening of the various plots.

It is impossible to draw any conclusion from the yields obtained. About the only consistent result is the smaller yield of wheat obtained where the land had been subsoiled. Despite the lack of proof, deep ploughing is still believed to be the best, and it is probably due to deep ploughing in previous years that shallow ploughing does not have a more injurious effect.

DEPTH OF PLOUGHING SOD.

This experiment is to try different depths of ploughing sod of tame grasses and clovers. The sod used is a mixture of timothy, western rye grass, red clover and alfalfa. The ploughing is done in midsummer as soon as the hay has been harvested. The next spring wheat is sown. After the wheat is harvested the land is ploughed again according to the depths specified, and the next year oats are grown.

DEPTH of Ploughing Sod to be Sown to Wheat followed by Oats.

Plot No.	Depth of Ploughing.	Yield of Wheat on Sod Land.		Yield of Oats following Wheat.	
		Bush.	Lb.	Bush.	Lb.
11	Ploughing 3 inches deep, sod and stubble	38	20	78	18
12	Ploughing 4 inches deep, sod and stubble	44	20	83	8
13	Ploughing 5 inches deep, sod and stubble	47	..	86	6
14	Ploughing 3 inches deep on sod and 6 inches deep after wheat	44	50	89	14

The grasses, and especially the alfalfa, were killed more effectively by the 5-inch ploughing than by the shallower. No difference was observed in date of ripening. The yields, in so far as one season proves anything, are in favour of the deeper ploughing.

SUMMER-FALLOW TREATMENT.

In this experiment, seventeen methods of handling summer-fallow are tested. In all such cases, such additional cultivation was given as seemed necessary to keep down the weeds and preserve a surface mulch. In order to present the experiment more clearly, the plots are reported in groups:—

PLOUGHING Once *versus* Twice.

Plot No.	Treatment Given.	Yield of Wheat on Summer-Fallow.				Yield of Oats Second Season.			
		1914.		Average of 3 years.		1914.		Average of 3 years.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Plough 4 inches June, pack if necessary and practicable, cultivate as necessary	40	10	41	37	90	10	73	15
2	Plough 6 inches June, pack if necessary and practicable, cultivate as necessary	43	10	44	23	86	16	78	11
3	Plough 8 inches June, pack if necessary and practicable, cultivate as necessary	43	40	44	43	87	12	78	31
4	Plough 4 inches June, cultivate. Plough 4 inches September, harrow	43	30	43	40	87	12	77	2
5	Plough 6 inches June, cultivate. Plough 6 inches September, harrow	42	40	44	30	83	18	78	18
6	Plough 8 inches June, cultivate. Plough 8 inches September, harrow	43	10	42	13	83	28	74	17
7	Plough 6 inches June, cultivate. Plough 4 inches September, harrow	45	30	44	27	96	16	78	15
8	Plough 4 inches June, cultivate. Plough 6 inches September, harrow	43	40	40	40	81	6	76	15
9	Plough 4 inches June, early as possible, cultivate.								
10	Plough 6 inches September, leave untouched	41	10	41	30	52	12	71	26
	Average of 3 plots ploughed once			43	34			76	27
	Average of 6 plots ploughed twice			42	50			76	4

BRANDON.

This is evidence towards the belief that under ordinary circumstances one ploughing is quite as good as two for summer-fallow, provided the land is kept clean by surface cultivation. The plots that were ploughed only once had a slight advantage in earliness.

DATE of Ploughing.

Plot No.	Treatment given.	Yield of Wheat on Summer-Fallow. 1914. Bush.	Lb.	Average of 3 years. Bush.	Lb.	Yield of Oats Second Season. 1914. Bush.	Lb.	Average of 2 years. Bush.	Lb.
11	Plough 6 inches May 15, harrow and pack if necessary, cultivate as necessary	44	40	46	27	74	14	98	23
12	Plough 6 inches June 15, harrow and pack if necessary, cultivate as necessary	42	40	44	37	73	8	95	5
13	Plough 6 inches July 15, harrow and pack if necessary, cultivate as necessary	42	50	44	3	75	30	95	15

It is rather disappointing that the showing in favour of the early ploughing is not more conclusive. This is probably due to the fact that in recent years the usual June rains were not forthcoming. Rains came mostly late in the season, and as a result were conserved as well by late as by early ploughing.

A result that does not show in the table is the effect on weeds. Weeds were quite bad in the July-ploughed land, and were kept under control by the earlier ploughings. Then the weeds were hand pulled, which no doubt helped the crop on July ploughing to make a better showing than it would have done had the weeds been allowed to grow.

PASTURE *versus* Cultivation.

Plot No.	Treatment given.	Yield of Wheat on Summer-Fallow. 1914. Bush.	Lb.	Average of 3 years. Bush.	Lb.	Yield of Oats Second Season. 1914. Bush.	Lb.	Average of 2 years. Bush.	Lb.
10	Plough 5 inches June, seed to rape or other green forage crop and pasture off	38	40	41	10	89	4	101	1
11	Plough 6 inches June 15th, harrow and pack if necessary, cultivate as necessary	42	40	44	37	73	8	95	5

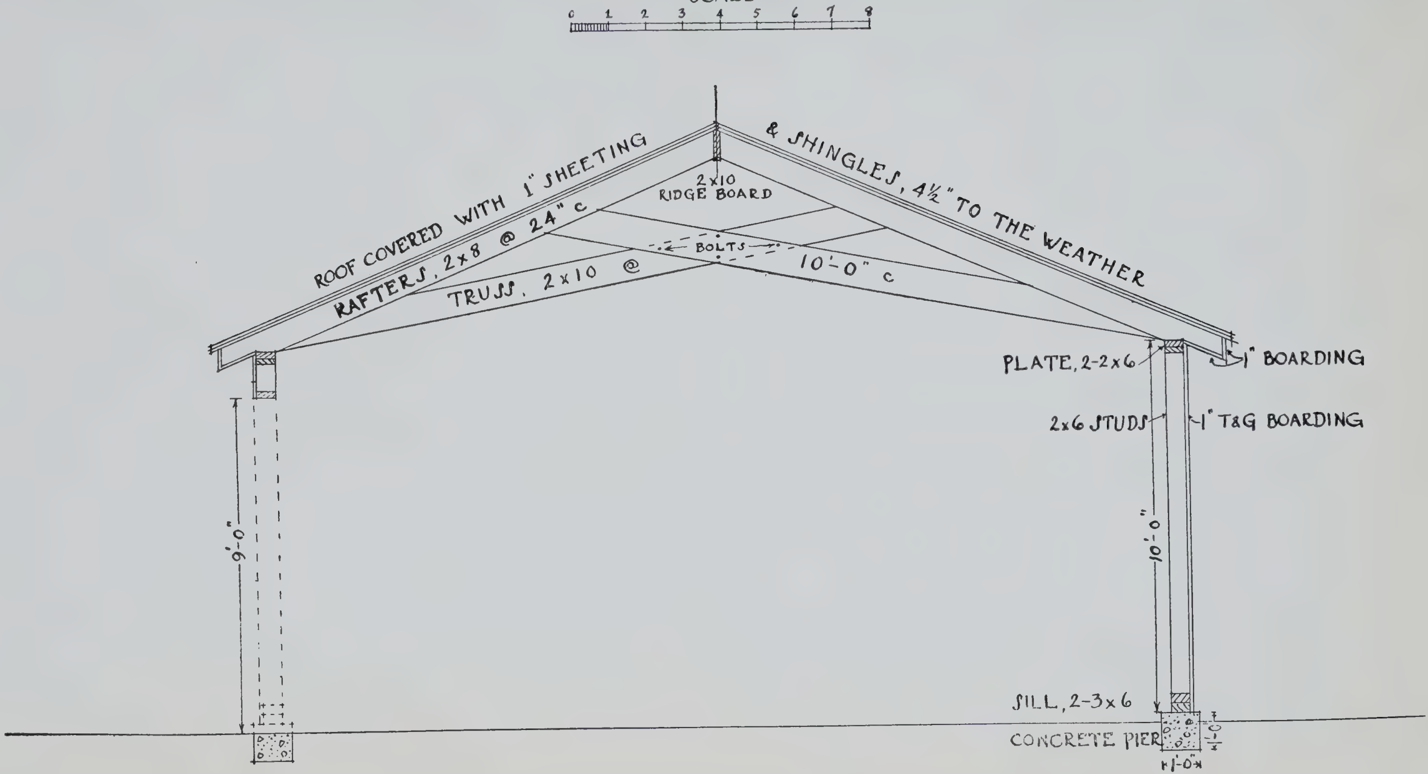
It is interesting to note that while the yield of wheat has been uniformly lower on the land that has been sown to rape and pastured than on the cultivated land, the yield of oats the following year is considerably higher. The control of weeds is more difficult on the rape land than where bare cultivation was practised. The wheat on rape land ripened two days earlier.

BRANDON.

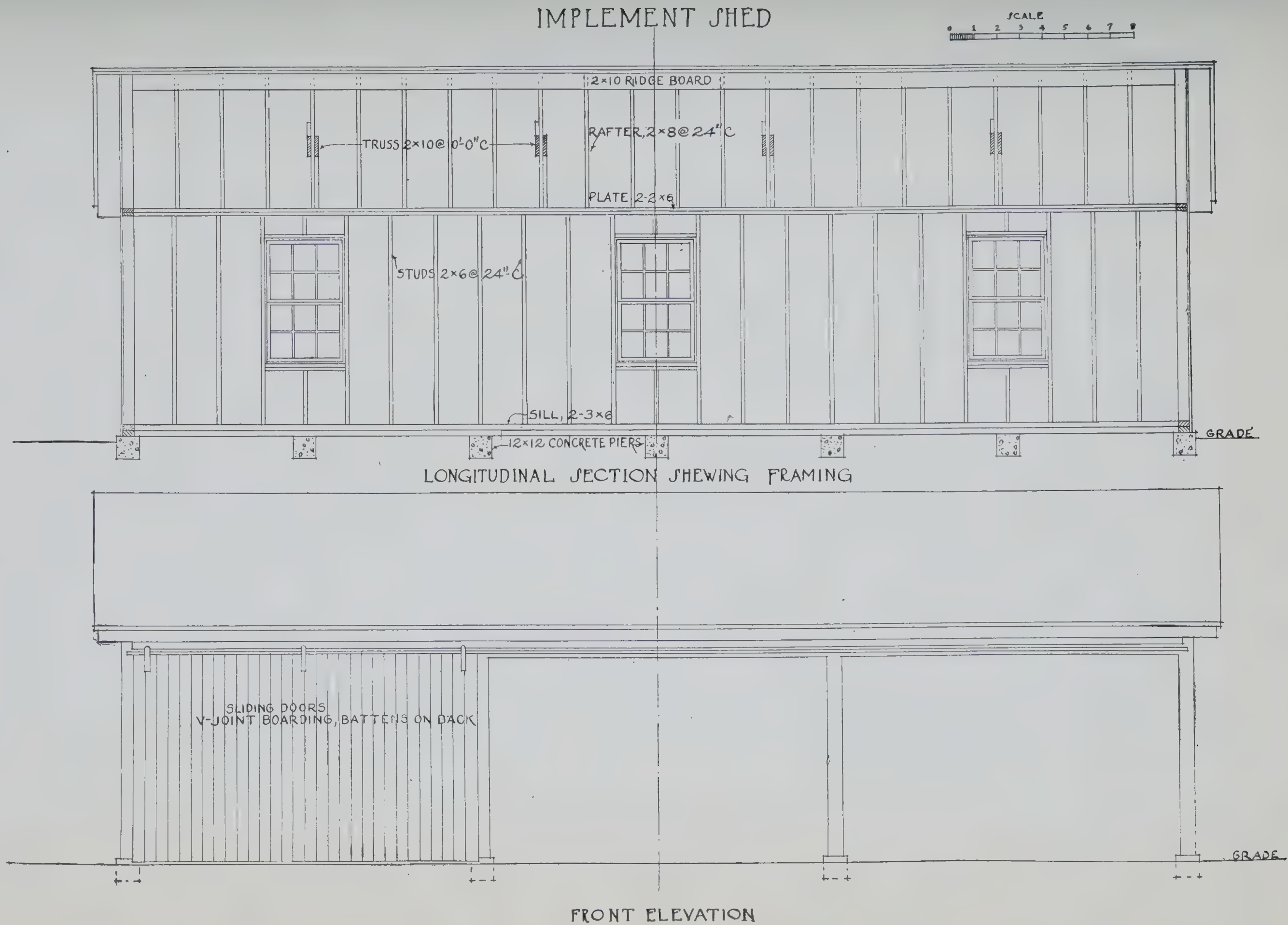
Wheat following alfalfa, Brandon Experimental Farm. This field yielded 44 bushels per acre in a season when the general crop was about two-thirds average.

16—1916—16a.

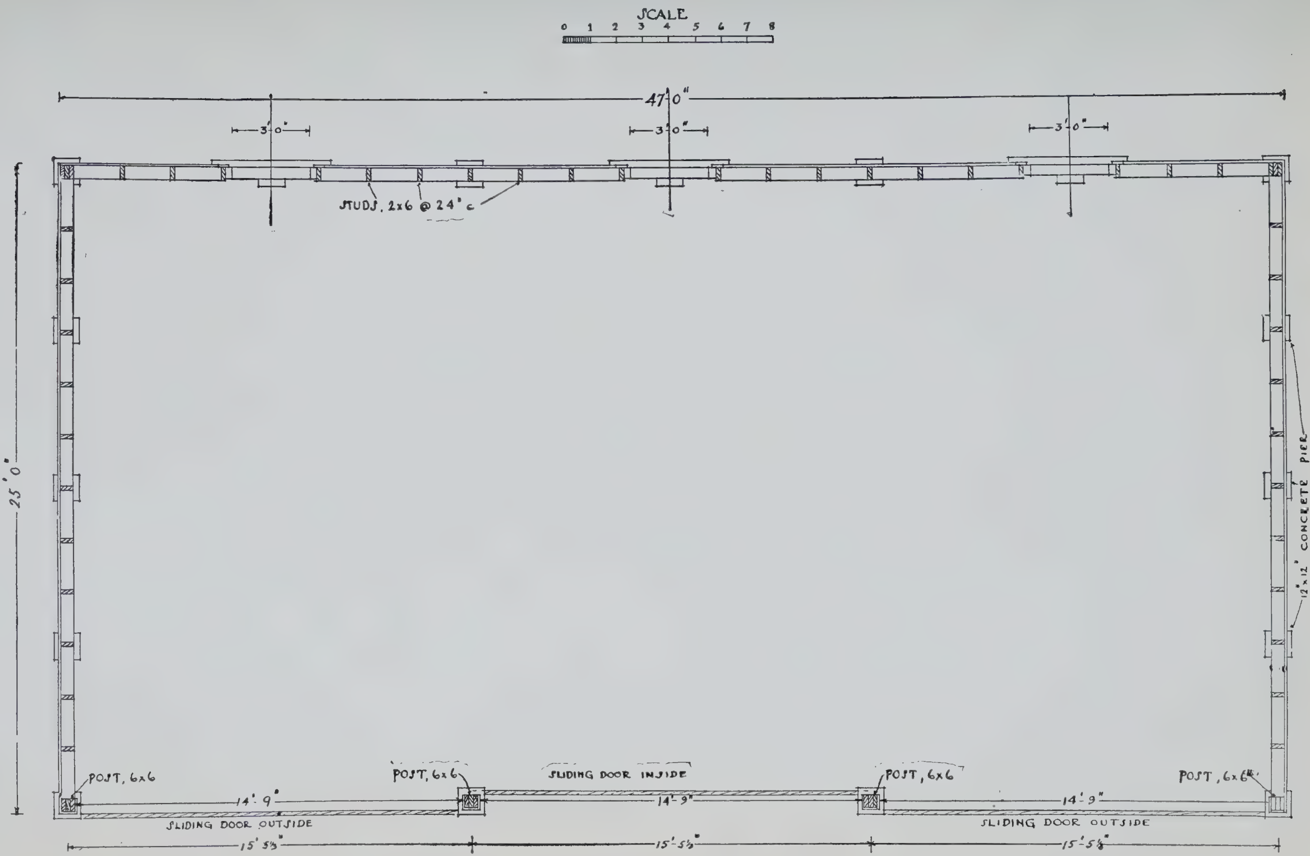
IMPLEMENT SHED



CROSS SECTION


IMPLEMENT SHED
SCALE
0 1 2 3 4 5 6 7 8
2×10 RIDGE BOARD
TRUSS 2×10@ 10'-0"C
RAFTER, 2×8@ 24"C
PLATE 2-2×6
STUDS 2×6@ 24"C
SILL, 2-3×6
12×12 CONCRETE PIERS
GRADE
LONGITUDINAL SECTION SHEWING FRAMING
SLIDING DOORS
V-JOINT BOARDING, BATTENS ON BACK
GRADE
FRONT ELEVATION

IMPLEMENT SHED



PLAN No. 1

FALL Cultivation before Summer-fallowing.

Plot No.	Treatment given.	Yield of Wheat 1914.	
		Bush.	Lb.
12	Plough 6 inches June 15, harrow and pack if necessary, cultivate as necessary........	42	40
14	Fall cultivate before summer-fallowing. Plough 6 inches June, harrow and pack if necessary, cultivate as necessary..........	45	00
15	Fall plough 4 inches before summer-fallowing. Plough 6 inches June, harrow and pack if necessary, cultivate as necessary.	44	00

The cultivation given plot No. 14 was a double discing. The increase in crop if dependable would pay for this work.

PACKING *versus* NO PACKING.

As a check on the results obtained in the regular packing experiment, two plots are used in this summer-fallowing experiment.

Plot No.	Treatment given.	Yield of Wheat.			
		1914.		Average of 5 years.	
		Bush.	Lb.	Bush.	Lb.
16	Plough 6 inches June, pack, cultivate as necessary..........................	43	00	47	00
17	Plough 6 inches, June, no packing, otherwise same as other plot......	40	40	43	7

This would indicate that it pays to pack summer-fallow land as soon as it is ploughed.

STUBBLE TREATMENT.

The purpose of this experiment is to determine the best method of handling land that has produced one grain crop and is intended to be sown to grain again. To provide the working material, each year, thirteen plots of wheat are sown on summer-fallowed land prepared in a uniform manner. The stubble land left after this wheat is removed is used in the fall and spring for the operation of the experiment.

WHEAT Stubble Land to be Sown to Wheat.

Plot No.	Treatment given.	Yield of Wheat. 1914. Bush.	Yield of Wheat. 1914. Lb.	Yield of Wheat. Average of 3 years. Bush.	Yield of Wheat. Average of 3 years. Lb.
1	Plough, autumn	37	10	31	13
2	Disc harrow, autumn	39	10	33	53
3	Burn stubble, then disc, autumn	40	20	34	7
4	Burn stubble, then plough, autumn	43	00	33	53
5	Burn stubble in spring, seed at once	44	30	34	57
6	Plough in spring, seed at once	41	00	35	37
7	Disc at cutting time, spring plough	39	50	33	7
8	Disc at cutting time, autumn plough	40	20	34	43
9	Plough autumn, subsurface pack at once	42	00	36	3
10	Plough spring, seed, subsurface pack	40	20	32	7

It is not advisable to attempt to draw conclusions from these results until the average of a larger number of years is obtained.

WHEAT Stubble Land to be Sown to Oats.

Plot No.	Treatment given.	Yield of Oats. 1914. Bush.	Yield of Oats. 1914. Lb.	Yield of Oats. Average of 3 years. Bush.	Yield of Oats. Average of 3 years. Lb.
11	Plough autumn, subsurface pack at once	87	2	85	10
12	Plough spring, seed, subsurface pack	90	00	84	31
13	Cultivate autumn, spring plough, seed	90	20	92	2

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SEEDING TO GRASS AND CLOVER.

This experiment is conducted for the purpose of finding the best preparatory crops for seeding down with or without a nurse crop. The seeding mixture used in this experiment is 10 pounds of western rye grass and 10 pounds of red clover.

Plot No.	Treatment given.	Yield of Hay per acre. 1914. Tons. Lb.	Yield of Hay per acre. Average of 2 years. Tons. Lb.
1	Seeding with nurse crop after summer-fallow	2 640	3 680
2	Seeding alone after summer-fallow	2 1,480	4 400
3	Seeding with nurse crop after hoed crop	2 1,320	3 1,500
4	Seeding alone after hoed crop	2 920	4 60
5	Seeding with nurse crop after first year wheat	2 —	2 1,500
6	Seeding alone after first year wheat	2 1,040	3 340
7	Seeding with oats to cut green after first year wheat	2 40	2 1,440
8	Seeding alone after first year wheat, manure 8 tons per acre ploughed in preceding fall	2 1,000	3 80
9	Seeding with nurse crop after second year wheat	2 ..	2 1,380
10	Seeding alone after second year grain (oats)	2 560	2 1,140
11	Seeding with nurse crop after second year wheat following hoed crop	1 1,240	2 1,020
	Average of plots 1, 3, 5 and 9, seeding with nurse crop		3 265
	Average of plots 2, 4, 6 and 10, seeding alone		3 985

It is quite apparent that seeding on summer-fallow or hoed-crop land gives decidedly better results than after grain crops. The terms "first-year wheat" and "second-year wheat" are intended to mean one and two crops of wheat after the land has been summer-fallowed. It will be observed that the more crops of grain that have been grown, the poorer is the result with the grass.

While slightly better results have been obtained by seeding alone than with nurse crops the difference is not sufficiently great to justify the loss of the crop of grain. This conclusion will apply only to districts where the supply of moisture is as great as at Brandon; in drier localities the opposite might be true. The catch of young plants was usually better with a nurse crop than without, but in the following summer, when dry weather came, the plots that had been sown alone grew the more vigorously.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS.

The following methods are being tried in this experiment:—

1. Plough, July 20 to 30, 5 inches deep. Pack and disc at once, disc in fall.
2. Plough, October, 5 inches deep, pack, disc harrow.
3. Plough, early July, 3 inches deep, backset September, cultivate as necessary.
4. Stiff-tooth rip, July, plough 5 inches deep September, cultivate.
5. Spring plough 5 inches deep, seed same spring to wheat.
6. Duplicate No. 5, sow flax.
7. Repeat No. 5, sow peas.
8. Plough May 15, work as summer-fallow.

A uniform sod has been grown on which to try this experiment. A mixture of timothy, western rye grass, red clover and alfalfa was used for this purpose. One set of plots has been broken according to the various treatments but results are not available yet.

APPLICATION OF BARNYARD MANURE.

Methods of applying barnyard manure on four different crops are tried in this experiment.

Application of Barnyard Manure for Corn on Land which has grown two Crops of Wheat.

Plot No.	Treatment Given.	Yield of Corn per Acre.			
		1914		Average of 2 years	
		Tons.	Lb.	Tons	Lb.
1	No manure, land fall ploughed	9	1,320	10	260
2	Apply on surface in fall after ploughing, work at once.	11	80	12	340
3	Apply in spring on surface of fall-ploughed land, work in at once	7	1,880	11	390
4	Plough in, in fall, right after applying	11	1,370	13	1,060
5	Plough in, in spring, right after applying	11	1,200	11	1,000
6	Winter apply, plough in spring	13	960	12	1,880
7	Winter apply, green manure, plough in spring	11	1,320	12	1,660

With the exception of plot 7, all received rotted manure. The quantity used was 12 tons per acre in every case. Method No. 4 gives the best average for the two years, and is probably as safe a method as any.

Application of Barnyard Manure for Corn on Summer-Fallow.

Plot No.	Treatment given	Yield of Corn per Acre.			
		1914.		Average of 2 years	
		Tons	Lb.	Tons	Lb.
8	Winter, apply green manure, disc in	13	640	14	1,520
9	No manure	13	520	14	660

APPLICATION of Barnyard Manure for Wheat (Second Crop after Summer-Fallow).

Plot No.	Treatment Given.	Yield of Wheat per Acre, 1914. Bush.	Lb.
1	Apply in winter green manure, disc in	39	20
3	Top dress with spreader after seeding	35	50
5	No manure	32	30
6	Apply in fall and plough in	40	10
7	Apply in spring and plough in	40	30
8	No manure, stubble disced in before ploughing	35	40
9	No manure, stubble burned	36	40

Twelve tons per acre were applied in each case, unless otherwise stated. The stubble land was fall ploughed in the case of each plot except No. 7. Rotted manure was used except on plot 1.

APPLICATION of Barnyard Manure for Wheat on Summer-Fallow.

Plot No.	Treatment Given.	Yield of Wheat per Acre, 1914. Bush.	Lb.
2	Apply in winter green manure on summer-fallow, disc in	45	10
4	Top dress with spreader, grain sown on summer-fallow	42	
5	No manure	40	

APPLICATION OF BARNYARD MANURE FOR BARLEY (SECOND CROP AFTER SUMMER-FALLOW).

Twelve tons per acre of rotted manure were applied except where otherwise stated. Wheat was the preceding crop on all plots and the land was all fall-ploughed except in plot 7.

APPLICATION of Barnyard Manure for Barley (Second Crop after Summer-Fallow).

Plot No.	Treatment Given.	Yield of Barley per Acre. Bush.	Lb.
1	Apply winter, green manure, disc in	53	46
3	Top dress with spreader after seeding	53	16
5	No manure	55	..
6	Apply in fall and plough in	65	10
7	Apply in spring and plough in	59	18
8	No manure, stubble disced in before ploughing	55	20
9	No manure, stubble burned	58	6

BRANDON.

APPLICATION of Barnyard Manure for Barley on Summer-Fallow.

Plot No.	Treatment Given.	Yield of Barley per Acre.	
		Bush.	Lb.
2	Apply in winter, green manure on summer-fallow, disc in	56	32
4	Top dress with spreader, grain sown on summer-fallow	62	24

APPLICATION of Barnyard Manure for Oats (Second Crop after Summer-Fallow).

Twelve tons of rotted manure were applied except where otherwise stated. Wheat was the preceding crop on all plots, and the land was all fall ploughed except in plot 7.

Plot No.	Treatment Given.	Yield of Oats Per Acre.	
		Bush.	Lb.
1	Apply in winter, green manure, disc in	83	8
3	Top dress with spreader after seeding	64	14
5	No manure	73	8
6	Apply in fall and plough in	82	12
7	Apply in spring and plough in	83	18
8	No manure, stubble disced in before ploughing	77	12
9	No manure, stubble burned	75	..

APPLICATION of Barnyard Manure for Oats on Summer-Fallow.

Plot No.	Treatment Given.	Yield of Oats per Acre.	
		Bush.	Lb.
2	Apply in winter green manure on summer-fallow, disc in	76	6
4	Top dress with spreader, grain sown on summer-fallow	78	18

It is apparent that the results on application of barnyard manure are too variable in this one season's work to draw any conclusions as yet.

GREEN MANURING.

In this experiment the growing of a crop of peas or vetches to be ploughed under is compared with a bare summer-fallow as a preparation for grain crops. Also, one plot of summer-fallow receives an application of barnyard manure. Following the season in which the experimental treatment is given, wheat is grown the next year, and oats the second one.

BRANDON.

GREEN MANURING FOR WHEAT FOLLOWED BY OATS.

Plot No.	Treatment Given.	Yield of Wheat following treatment.				Yield of Oats second season after treatment.			
		1914		Average of 3 years.		1914		Average of 2 years.	
		Bush.	Lb.	Bush.	Lb.	Bush.	Lb.	Bush.	Lb.
1	Summer-fallow	49	30	46	37	95	30	101	26
2	Peas, two bushels Golden Vine (or other similar variety) ploughed under early in July	50	..	46	33	87	22	94	6
3	Peas, two bushels Golden Vine, ploughed under when in blossom	31	40	40	3	92	32	97	32
4	Tares, 1 bushel per acre, ploughed under late July	35	50	42	57	77	22	94	29
5	Summer-fallow, barnyard manure, 12 tons per acre, applied on summer-fallow in September	40	..	50	47	88	28	100	5
6	Summer-fallow	42	20	47	20	88	18	98	28

Wheat plots No. 3 and 4 showed a considerable quantity of weeds and volunteer grain, due doubtless to the later date at which these plots are ploughed.

The results of these experiments seem to indicate that green crops ploughed under give as good results as summer-fallow, if they are ploughed under early and the land kept clean afterward, but the yield is decreased when the green crop is allowed to grow until near the end of July. This is probably due to too great drying out of the land. Barnyard manure would seem to be preferable to green manuring as a means of fertilizing the land.

SEED-BED PREPARATION.

In this experiment three degrees of preparing a seed-bed are compared. This is tried with wheat on summer-fallow and with oats on fall ploughed stubble land.

PREPARATION OF SEED-BED FOR OATS ON FALL PLOUGHING.

The fall ploughing is done uniformly well on all plots, and the experimental treatment refers only to the work in the spring. What constitutes "poor," "good," and "extraordinary" treatment will vary according to the soil and season. In 1914 the soil was mellow and in fine condition naturally, so that very little work was required to prepare a first-class seed-bed. The "poor" plot got no spring cultivation, the "good" got one stroke of the harrow, and the "extraordinary" got three strokes of the harrow and a packing.

PREPARATION OF SEED-BED FOR OATS.

Plot No.	Treatment Given.	Yield of Oats per Acre.			
		1914.		Average of 3 years	
		Bush.	Lb.	Bush.	Lb.
1	Poor preparation	91	4	89	11
2	Good preparation	92	32	95	23
3	Extraordinary	104	14	101	26

From this it will be seen that it pays to work up a good seed-bed in the spring before sowing on fall or spring ploughing.

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PREPARATION OF SEED-BED FOR WHEAT ON SUMMER-FALLOW.

In this part of the experiment, the summer-fallow was all done equally well, the difference in cultivation being all in the spring. "Poor" got no spring cultivation; "good" got one harrowing; "extraordinary" got three harrowings and packing both before and after seeding.

PREPARATION of Seed-bed for Wheat.

Plot No.	Treatment Given.	Yield of Wheat per Acre. 1914. Bush.	Lb.	Average of 3 years Bush.	Lb.
1	Poor preparation	48	50	42	7
2	Good preparation	47	20	42	43
3	Extraordina y preparation	49	20	42	40

The results would indicate that a well worked summer-fallow does not need spring cultivation.

SOIL PACKERS.

In order to obtain information in regard to the use of soil packers, this experiment has been conducted since 1911. Three types of packers are being used, and a large number of methods of application are being tried. The work on the land, other than packing, is kept as uniform as possible, and all cultivation necessary to good farming is performed.

SOIL PACKING in preparation for Wheat following Summer-fallow.

Plot No.	Treatment given.	Yield of Wheat per acre. 1914. Bush.	Lb.	Average of 3 years Bush.	Lb.
1	No packing	41	30	43	37
2	Packed with surface packer after seeding	44	..	48	3
3	Packed with surface packer after seeding, harrowed after packing	43	..	43	47
4	Packed with subsurface packer after seeding	44	10	47	..
5	Packed with subsurface packer after seeding, harrowed after packing.	39	20	43	3
6	Packed with combination packer after seeding	46	50	47	7
7	Packed with combination packer after seeding, harrowed after packing	44	50	47	7
8	Packed with surface packer both before and after seeding	44	20	45	7
9	Paked with subsurface packer both before and after seeding	44	30	45	57
10	Packed with combination packer both before and after seeding	44	..	44	47
11	Packed with surface packer before seeding	43	20	46	27
12	Packed with subsurface packer before seeding	45	40	44	27
13	Packed with combination packer before seeding	45	30	47	17
14	No packing	42	40	45	20
15	Packed with surface packer right after ploughing summer-fallow	41	30	44	30
16	Packed with subsurface packer right after ploughing summer-fallow	43	50	44	50
17	Packed with combination packer right after ploughing summer-fallow	43	10	44	50
18	Packed with surface packer right after ploughing summer-fallow, and again in spring after seeding	44	10	47	30
19	Packed with subsurface packer right after ploughing summer-fallow, and again in spring after seeding	44	20	47	17
20	Packed with combination packer right after ploughing summer-fallow, and again in spring after seeding	38	40	47	33
21	No packing	38	50	45	3
22	No packing, grain harrowed when 6 inches high	36	50	43	10
23	Packed with surface packer when grain is 6 inches high	38	50	43	33
24	Rolled with smooth roller when grain is 6 inches high	40	10	43	10
25	No packing	38	50	42	7

SUMMARIES of Results of Packing on Summer-Fallow.

Kind of packer.	Average Yield for 3 years.	
	Bush.	Lb.
Surface packer (average of plots 2, 8, 11, 15 and 18)	46	21
Subsurface packer (average of plots 4, 9, 12, 16 and 19)	45	46
Combination packer (average of plots 6, 10, 13, 17 and 20)	46	19
No packer (average of plots 1, 14, 21 and 25)	43	13

Time of packing.	Average Yield for 3 years.	
	Bush.	Lb.
After seeding (average of plots 2, 4 and 6)	47	23
Before seeding (average of plots 11, 12 and 13)	46	4
Before and after seeding (average of plots 8, 9 and 10)	45	17
At time of ploughing summer-fallow (average of plots 15, 16 and 17)	44	43
At time of ploughing summer-fallow and after seeding (average of plots 18, 19 and 20)	47	29

Packer *vs.* Harrow as last implement.	Average Yield for 3 years.	
	Bush.	Lb.
Packer applied last (average of plots 2, 4 and 6)	47	23
Harrowed after packing (average of plots 3, 5 and 7)	44	42

There is nothing very conclusive in the results as yet. Certainly no one type of packer has been proven to be superior to the others. However, all types, on the average, give an increase of about 3 bushels per acre over no packing. This is not large, but it is worth while. With regard to time of packing, the results obtained seem to favour packing after seeding as being the most effective. The effect of harrowing after packing has been to decrease the yield.

BRANDON.

SOIL PACKING FOR WHEAT ON SPRING PLOUGHED STUBBLE LAND.

The land used for this part of the experiment and for the fall-ploughing section which follows had grown one crop of wheat after summer-fallowing.

SOIL Packing for Wheat on Spring Ploughed Stubble Land.

Plot No.	Treatment given.	Yield of Wheat per acre. 1914.		Average of 3 years.	
		Bush.	Lb.	Bush.	Lb.
1	Packed with subsurface packer before seeding	44	10	39	30
2	Packed with surface packer before seeding	40	50	39	43
3	Packed with combination packer before seeding	41	..	38	33
4	Packed with subsurface packer before and after seeding	41	..	39	53
5	Packed with surface packer before and after seeding	32	50	37	27
6	Packed with combination packer before and after seeding	38	40	37	40
7	No packing	40	30	37	17
8	Packed with surface packer after seeding	41	30	38	10
9	Packed with subsurface packer after seeding	41	20	41	..
10	Packed with combination packer after seeding	42	40	38	30
11	No packing	46	..	38	13

SUMMARIES of Results of Packing on Spring Ploughed Stubble Land.

Kind of packer.	Average Yield for 3 years.	
	Bush.	Lb.
Surface packer (average of plots 2, 5 and 8)	38	27
Subsurface packer (average of plots 1, 4 and 9)	40	8
Combination packer (average of plots 3, 6 and 10)	38	14
No packer (average of plots 7 and 11)	37	45

Time of packing.	Average Yield for 3 years.	
	Bush.	Lb.
Before seeding (average of plots 1, 2 and 3)	39	15
After seeding (average of plots 8, 9 and 10)	39	13
Before and after seeding (average of plots 4, 5 and 6)	38	20

These averages show too little difference to permit of drawing any conclusions.

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Soil Packing for Wheat on Fall Ploughed Stubble Land.

Plot No.	Treatment given.	Yield of Wheat per acre. 1914.		Average of 3 years.	
		Bush.	Lb.	Bush.	Lb.
12	No packing	42	50	57	50
13	Packed with subsurface packer in fall	45	10	39	27
14	Packed with subsurface packer in spring before seeding	45	50	39	20
15	Packed with subsurface packer in spring after seeding	42	..	39	33
16	Packed with surface packer in fall	42	..	38	30
17	Packed with surface packer in spring before seeding	42	30	39	27
18	Packed with surface packer in spring after seeding	44	40	39	20
19	Packed with combination packer in fall	42	50	39	47
20	Packed with combination packer in spring before seeding	40	30	39	30
21	Packed with combination packer in spring after seeding	45	50	40	13
22	No packing	42	50	38	27
23	Packed with surface packer in fall and in spring after seeding	45	50	39	33
24	Packed with subsurface packer in fall , and in spring after seeding	42	20	39	53
25	Packed with combination packer in fall and in spring after seeding	44	..	38	33

Summaries of Results of Packing on Fall Ploughing.

Kind of packer.	Average Yield for 3 years.	
	Bush.	Lb.
Surface packer (average of plots 16, 17, 18 and 23)	39	17
Subsurface packer (average of plots 13, 14, 15 and 24)	39	33
Combination packer (average of plots 19, 20, 21 and 23)	39	31
No packer (average of plots 12 and 22)	38	8

Time of packing.	Average Yield for 3 years.	
	Bush.	Lb.
In fall (average of plots 13, 16 and 19)	39	10
In spring before seeding (average of plots 14, 17 and 20)	39	26
In spring after seeding (average of plots 15, 18 and 21)	39	42
In fall and in spring after seeding (average of plots 23, 24 and 25)	39	20

These very uniform averages do not prove the superiority of any implement or method.

Brandon.

DEPTH OF SEEDING.

This experiment was tried with wheat on summer-fallowed land, and with oats on fall-ploughed wheat land. A double disc drill was used.

DEPTHS of Seeding Wheat on Summer-Fallow.

Plot No.	Depth of seeding.	Yield of Wheat per acre. 1914. Bush.	Lb.	Average of 3 years. Bush.	Lb.
1	1 inch	45	50	41	33
2	2 inches	42	50	44	43
3	3 inches	42	30	42	37
4	4 inches	43	10	42	37

DEPTHS of Seeding Oats on Wheat Land (Fall Ploughed).

Plot No.	Depth of seeding.	Yield of Oats per acre. 1914. Bush.	Lb.	Average of 3 years. Bush.	Lb.
1	1 inch	92	22	94	11
2	2 inches	86	16	91	33
3	3 inches	82	12	97	9
4	4 inches	87	22	88	11

COMMERCIAL FERTILIZERS.

This experiment was tried with corn on land that had been in grass for one year after having grown wheat and oats.

Plot No.	Fertilizer used.	Yield of Corn per Acre. 1914. Tons.	Lb.
2	Nitrate of soda, 160 pounds per acre	16	840
3	Superphosphate, 300 pounds per acre	13	1,840
4	Muriate of potash, 100 pounds per acre	13	1,840
5	No fertilizer	13	520
6	Nitrate of soda, 160 pounds per acre; superphosphate, 300 pounds per acre; and muriate of potash, 100 pounds per acre	13	1,440
7	Nitrate of soda, 160 pounds per acre; superphosphate, 300 pounds per acre	12	1,520
8	Nitrate of soda, 160 pounds per acre; muriate of potash, 100 pounds per acre	13	520
9	Superphosphate, 300 pounds per acre; muriate of potash, 100 pounds per acre	12	920
10	No fertilizer	11	1,480
11	Basic slag, 500 pounds per acre	11	1,480
12	No fertilizer	12	120
13	No fertilizer	13	200
14	Barnyard manure, 16 tons per acre	14	720
15	Barnyard manure, 8 tons per acre	14	640

BRANDON.

UNDERDRAINAGE.

To see if ordinary Manitoba soil would be benefited by underdrainage, two plots were drained with tile, one at a depth of 3 feet and the other 4 feet.

Treatment.	Yield of Wheat per Acre.	
	Bush.	Lb.
Average of two drained plots	46	..
Average of eight undrained plots	44	9

ALFALFA SEEDED WITH OR WITHOUT NURSE CROP.

It is the general custom through the West to recommend strongly that alfalfa be sown alone. Nurse crops are generally believed to be very injurious. However, no very definite data appeared to be available on this question. In order to test the matter out, an acre of alfalfa was sown with a bushel of barley used as nurse crop. This was sown on corn stubble and was part of a field of about 5 acres, on the remainder of which the alfalfa was sown alone. The alfalfa sown with the barley germinated all right, but the growth it made was very weak and spindly. It is impossible as yet to say how it has withstood the winter, but the indications in the fall were not at all hopeful. The alfalfa sown alone made a strong, vigorous growth and went into winter in first-class condition.

QUANTITY OF SEED PER ACRE.

Flax.—Duplicate plots of flax were sown at different rates of seed per acre. All were sown on the same day (May 16) on the same piece of land. The results were as follows:—

Quantity of seed used per Acre.	Date of Maturity.	Yield of Flax per Acre.			
		1914.		Average of 2 years	
Lb.		Bush.	Lb.	Bush.	Lb.
18	Aug. 12	10	45	14	18
23	" 12	10	..	13	12
28	" 11	10	40	15	..
33	" 11	9	36	14	6
38	" 11	10	40	12	28

The results are not very conclusive but seem to favour the common practice of sowing ½ bushel (28 pounds) per acre.

Alfalfa.—A similar test was tried with alfalfa. The following rates were used: 7½ pounds, 10 pounds, 12½ pounds, 15 pounds, 17½ pounds and 20 pounds per acre. Good germination and a good season's growth were obtained on all plots. It is, of course, impossible to report yields until the second season.

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DATES OF SEEDING.

Flax.—In order to obtain definite figures on the question of the proper date to sow flax, plots were sown every half month from May 1 to June 15. One-half bushel of seed was used in each case on summer-fallowed land. The late-sown flax received a little more cultivation than the early-sown in order to keep down the weeds.

Date of sowing Flax.	Date of Ripening.	Yield per Acre.	
		Bush.	Lb.
May 1	Aug. 5	12	23
May 15	Aug. 8	12	13
June 1	Aug. 20	9	6
June 15	Sept. 13	4	36

It will be observed that May 1 and May 15 gave practically the same results, but that there was a rapid decrease after May. The crop from June 15 sowing was practically a complete failure, being considerably frosted, as well as a light crop.

Alfalfa.—Different dates of seeding were tried with alfalfa with equally as striking results. Plots of alfalfa were sown every half-month from May 1 to July 15. The land used was well-prepared summer-fallow. Good catches were obtained from the May 1 and May 15 seeding, a fairly good catch was obtained from June 1 seeding, June 15 gave poor results, July 1 very poor, and that sown on July 15 was a complete failure. It is not likely that such striking results would be obtained every year, as the extreme heat and drought of midsummer this year were exceptionally hard on new alfalfa seeding. Nevertheless, it is likely that early seeding will nearly always give the best results.

BRANDON.

EXPERIMENTAL FARM FOR SOUTHERN SASKATCHEWAN, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MacBEAN, B.S.A.

WEATHER CONDITIONS AND CROP NOTES, 1914.

The season of 1914 was very unfavourable for the production of good field crops in southern Saskatchewan. While the spring opened up comparatively early and there were a few early rains, causing a good germination of the early sown wheat, the dry weather during the latter part of May and all of June retarded the growth of this grain and caused an uneven germination of late-sown wheat, oats and barley, the result being that all cereals produced a very short straw and a light yield. The frost on August 9 damaged the wheat crop to quite an extent, also nearly destroyed the fodder corn. The hay and pasture crops were all light. While the crop yields were all comparatively light, the results obtained from different cultural experiments were very outstanding, and many valuable lessons were learned in the conservation of moisture.

In the following table there are recorded the temperature, precipitation and sunshine for 1914:—

Some Weather Observations taken at Experimental Farm, Indian Head, 1914.

Month.	Temperature F.			Precipitation.			Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
January	7·19	44	—34	....	12·50	1·25	83·2
February	—4·83	45	—38	....	4·00	0·40	113·2
March	21·93	47	—19	....	10·00	1·00	111·6
April	37·53	70	2	0·09	12·00	1·29	158·5
May	50·54	83	22	0·58	10·00	1·58	243·4
June	59·06	90	40	2·28	....	2·28	219·6
July	69·80	100	42	1·50	....	1·50	304·6
August	59·42	89	29	1·33	....	1·33	231·6
September	54·73	88	28	0·47	....	0·47	181·9
October	44·29	80	10	1·16	....	1·16	126·2
November	24·33	56	—23	0·13	9·00	1·03	65·7
December	1·93	27	—32	....	4·50	0·45	23·3
Total for year	....	....	....	7·54	62·00	13·74	1862·8

FIELD CROP YIELDS.

YIELDS OF SPRING WHEAT.

In the field tests, four named varieties of wheat were used. These were sown on summer-fallow, corn and stubble land. The Marquis is the product of a plot sown with special registered Marquis supplied by the Dominion Cerealist in 1912. The registered Red Fife is from special registered seed supplied from Ottawa in 1914.

YIELDS of Spring Wheat.

Plot No.	Name of Variety.	Number of days maturing	Yield of grain per acre.	
			Bush.	Lb.
1	Marquis (fallow)	111	45	30
2	Red Fife (fallow)	123	40	52
3	Marquis (stubble)	105	38	29
4	Marquis (fallow)	116	36	54
5	Marquis (fallow)	110	34	30
6	Pioneer (fallow)	110	28	38
7	Marquis (fallow)	112	27	27
8	Marquis (corn stubble)	103	26	23
9	Marquis (stubble)	105	25	54
10	Marquis (fallow)	117	23	50
11	Marquis (stubble)	106	16	29
12	Prelude (fallow)	96	16	26

YIELDS OF WINTER RYE.

In the fall of 1913, a 10 acre field which had produced Prelude wheat was disced and sown with winter rye. This germinated well and gave a fair growth in the fall of 1913, but the dry weather during the summer of 1914 caused a very light yield of grain. The few wild oat plants which were in this field were cut before the seed had become mature enough to grow. A small field of summer-fallow was also sown at the same time. The yield on this was equal to former seasons.

YIELDS OF OATS.

Three varieties of oats were grown in field lots. The field of Victory was damaged to some extent with cutworms until their ravages were stopped by the use of poisoned bran. This was made by mixing one pound of Paris green with 40 pounds of bran, and moistening with sweetened water. The mixture was scattered where the worms were working in the evening. They ate the bran in preference to the grain, and were poisoned. About two applications were sufficient to completely exterminate them.

YIELDS of Oats.

Plot No.	Name of Variety.	Number of days maturing	Yield of grain per acre.	
			Bush.	Lb.
1	Victory (fallow)	94	80	20
2	Ligowo (fallow)	87	75	18
3	Banner (fallow)	91	72	16
4	Banner (stubble)	87	64	27
5	Banner (stubble)	100	58	8
6	Banner (stubble)	91	44	1

YIELDS OF BARLEY.

Two varieties of six-row barley and one of two-row barley were sown in the fields in 1913. The Manchurian seemed to shell more readily with the wind than did the O. A. C. No. 21.

Plot No.	Name of Variety.	Number of days maturing	Yield of grain per acre.	
			Bush.	Lb.
1	O. A. C. No. 21 (fallow)	84	56	17
2	Manchurian (fallow)	84	55	
3	Canadian Thorpe (fallow)	90	53	40
4	Manchurian (corn stubble)	83	51	38
5	Manchurian (fallow)	87	49	..

YIELDS OF FLAX.

Two of Dr. Saunders' new selections of flax, Novelty and Longstem, were tried out in the field along with Premost. Due to the dry weather immediately after seeding, the yields of all are comparatively low.

YIELDS of Flax.

Plot No.	Name of Variety.	Number of days maturing	Yield of seed per acre.	
			Bush.	Lb.
1	Premost (fallow)	96	14	..
2	Novelty (fallow)	100	13	49
3	Longstem (fallow)	100	10	..

YIELD OF FIELD PEAS.

A field of 5 acres was sown to Arthur peas. These matured comparatively early and gave a fair yield of peas of good quality.

YIELD of Peas.

Plot No.	Name of Variety.	Number of days maturing	Yield of grain per acre.	
			Bush.	Lb.
1	Arthur (fallow)..	107	21	55

COST OF PRODUCTION OF FIELD CROPS.

The cost of producing field crops is always one of interest to both the business man and farmer. While conditions on an Experimental Farm are not identical with conditions on an average farm, the results will at least be comparative, and will be valuable if considered in this manner.

COST of Production of Field Crops, Indian Head, 1914.

Crop.	Area.	Soil Preparation.	Cost per acre.	Cost per bush.	Cost per ton.	Value per acre.	Profit per acre.
	acres.		$ c.	cents.	$ c.	$ c.	$ c.
Wheat..............	27·75	Summer-fallow....	10 63	35	....	26 00	15 37
Wheat..............	11·25	Stubble spring ploughed........	12 96	47	....	24 53	11 57
Wheat..............	6·25	Stubble (burnt)...	8 27	50	....	13 85	5 58
Wheat..............	5·50	Corn land.........	10 75	40	....	22 48	11 75
Oats................	11·00	Stubble spring-ploughed........	11 70	23	....	20 07	8 37
Barley..............	6·00	Corn land.........	12 01	23	....	27 14	15 13
Hay................	16·50	First crop after seeding with nurse crop.......	6 99	....	13 45	8 03	1 19
* Corn..............	11·50	Summer-fallow, top-dressed.....	13 80	....	1 84	21 96	8 15

* Cost of summer-fallowing, not included.

ROTATION OF CROPS.

The rotation of crops is a very important experiment since it not only considers the yield of grain, hay, corn and roots obtained in the different arrangements, but also aims to obtain the cost of production and profit per acre.

ROTATION "C" (THREE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

This rotation requires the area to be divided into three approximately equal fields. This rotation is followed by the farmers throughout the southern portion of the province.

INDIAN HEAD.

The only objection to it is that it tends to exhaust the vegetable matter and facilitates the introduction of weeds. This year the field that was in stubble was badly infested with Quack grass and, because of its having to be cropped with wheat, considerable difficulty was experienced in keeping the grass from spreading.

ROTATION "J" (SIX YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat.
Fourth year.—Oats, seeded down with 8 pounds western rye and 8 pounds alfalfa per acre.
Fifth year.—Hay.
Sixth year.—Hay or pasture.

This rotation would require the farm to be divided into six fields of equal size, and if some pasture is necessary it requires fencing. This is a good mixed farmers' rotation since it includes the maximum amount of grain and at the same time allows for the production of considerable feed and pasture. The only objection is the difficulty of obtaining a catch of grass when seeding with a nurse crop on the second-year wheat stubble.

ROTATION "P" (EIGHT YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat.
Fourth year.—Summer-fallow.
Fifth year.—Corn, manured at the rate of 15 tons per acre.
Sixth year.—Barley, seeded with 8 pounds rye grass and 8 pounds alfalfa per acre.
Seventh year.—Hay.
Eighth year.—Pasture.

This rotation requires the farm to be divided into eight fields, and is suited to a farmer who wishes to raise some grain and keep a comparatively large amount of live stock. It would seem to be well adapted to a dirty farm, since out of eight years there are six in succession in which the land receives cultivation or crops which are conducive to the eradication of weeds.

ROTATION "R" (NINE YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Corn manured at the rate of 15 tons per acre.
Third year.—Wheat.
Fourth year.—Oats.
Fifth year.—Summer-fallow.
Sixth year.—Wheat.
Seventh year.—Oats, seeded down with a mixture of 8 pounds western rye grass and 8 pounds alfalfa.
Eighth year.—Hay.
Ninth year.—Pasture.

This rotation would be adapted to a stock farm, as in nine years there are only two crops of wheat.

In order to determine the profits from these rotations, fixed values are used from year to year. These may be found on page 245 of this report.

PROFITS FROM DIFFERENT ROTATIONS.

Since the final test for the different rotations is the profit given per acre, a table showing this is given herewith.

ROTATION "C"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st....	Wheat........	Fallow.........	6 25	12 50	3 75	......	......	......	......	48	......	......
2nd...	Fallow.......	Wheat.........	6·25	12 50	20 94	9·50	1 80	......	......	25	......	......
3rd....	Wheat........	Wheat.........	6·25	12 50	20 20	7·75	1 47	5	3·5	19	......	......
	Aggregate		18 75	37 50	44 89	17·25	3 27	5	3·5	92	......	......
	Average per acre.............		......	2 00	2 39	0·92	0 17	0·27	0·18	4·9	......	......

ROTATION "J"

Rotation Year.	1913.	1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual Hours.	Manual Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
3rd....	Wheat........	Wheat.........	5	10 00	16 05	67·75	12 87	......	2·00	35·25	......	......
4th....	Wheat........	Oats.........	5	10 00	15 44	15·75	3 00	......	15·25	23·75	......	......
5th....	Oats..........	Hay...........	5	10 00	9 80	8·00	1 52	2·00	5·25	......	......	......
6th....	Hay..........	Pasture........	5	10 00	9 80	7·00	1 33	2·00	8·00	......	......	......
1st....	Pasture.......	Fallow.........	5	10 00	3 00	......	......	......	......	49·50	......	......
2nd...	Fallow.......	Wheat.........	5	10 00	19 05	14·25	2 71	......	4·00	20·00	......	......
	Aggregate....................		30	60 00	73 14	112·75	21 43	4·00	34·50	128·50	......	......
	Average per acre		......	2 00	2 44	3·76	0 71	0 13	1·15	4·28	......	......

ROTATION "P"

Rotation Year.	1913.	1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual Hours.	Manual Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
4th....	Wheat........	Fallow.........	6	23 25	......	......	......	......	1	39·25	......	......
5th....	Fallow........	Corn...........	6	23 25	12 61	87·50	16 62	11	48	28·25	......	......
6th....	Corn..........	Barley.........	6	23 25	17 50	19	3 61	......	10	22·50	......	......
7th....	Barley........	Hay...........	6.	23 25	11 76	22	4 18	4·25	21·75	......	......	......
8th....	Hay..........	Pasture........	6	23 25	11 76	11	2 09	3	11·75	......	......	......
1st....	Pasture.......	Fallow.........	6	23 25	3 60	......	......	......	......	48·25	......	......
2nd...	Fallow.......	Wheat.........	6	23 25	18 90	9·75	1 85	......	......	25·25	......	......
3rd....	Wheat........	Wheat.........	6	23 25	20 04	9·75	1 85	......	5	48·25	......	......
	Aggregate....................		48	186 00	96 17	159·00	30 20	18·25	97·50	211·75	......	......
	Average peracre.............		......	3 87	2 00	3·31	0 63	0·38	2·03	4·41	......	......

ROTATION "R"

Rotation Year.	1913.	1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual Hours.	Manual Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
5th....	Oats..........	Fallow.........	5·5	20 16	3 30	......	......	......	......	40	......	......
6th....	Fallow........	Wheat.........	5·5	20 16	12 99	30	5 70	......	11	20	......	......
7th....	Wheat........	Oats...........	5·5	20 16	16 04	12	1 80	......	3	32·75	......	......
8th....	Oats..........	Hay...........	5·5	20 16	10 78	34	6 46	6.5	19	......	......	......
9th....	Hay..........	Pasture........	5·5	20 16	10 78	10	1 90	3·25	8·50	......	......	......
1st....	Pasture.......	Fallow.........	5·5	20 16	3 30	9	1 71	2·50	11	64	......	......
2nd...	Fallow........	Corn...........	5·5	20 16	8 26	140	26 60	10·00	37·75	12	......	......
3rd....	Corn..........	Wheat.........	5·5	20 16	15 42	11·25	2 13	......	4·75	23	......	......
4th....	Wheat........	Oats...........	5·5	20·16	16 90	12	2 28	......	4·50	30·50	......	......
	Aggregate....................		49·5	181 44	97 77	338·25	48 58	22·25	99·50	222·25	......	......
	Average per acre.............		......	3 67	1 97	6·83	0 98	·45	2·01	4·49	......	......

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(three years' duration.)

IN RAISING CROP.							PARTICULARS OF CROP.						
							Weight.						
Value of Horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed Crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
19 68		35 93	5 75										−5 75
10 25	10 43	55 92	8 95	0 37½			8,940	12,420			125 41	20 05	11 10
10 33	7 21	51 71	8 27	0 50			6,180	8,340			86 57	13 85	5 58
40 26	17 64	143 56									211 98		
2 15	0 94		7 65									11 30	3 65

(six years' duration).

15 13	12 18	66 23	13 24	0 38			10,440	20,400			149 40	29 88	16 64
14 92	11 32	54 68	10 87	0 19			9,622	9,278			105 49	21 10	10 23
2 32		23 64	4 73						4,520		22 60	4 52	−0 21
3 26		24 39	4 86						3,170		15 85	3 17	−1 69
20 29		33 29	6 65										−6 65
9 56	12 88	54 20	10 84	0 29½			11,040	14,280			154 34	30 87	20 03
65 48	36 38	256 43									447 68		
2 18	1 21		8 54									14 92	6 38

(eight years' duration).

16 43		39 68	6 61										−6 61
30 87		83 35	13 89							98,406	147 60	24 60	10 71
12 62	15 10	72 08	12 01	0 23			14,496	17,904			162 86	27 14	15 13
8 54		47 73	7 95						11,250		56 25	9 38	1 43
4 80		41 90	6 98						6,140		30 70	5 12	−1 86
19 78		46 63	7 77										−7 77
10 35	14 98	69 33	11 55	0 32			12,840	14,400			178 40	29 73	18 18
21 48	9 52	76 14	12 69	0 56			8,160	12,720			115 16	19 19	6 50
124 87	39 60	476 84									690 97		
2 60	0 83		9 93									14 39	4 46

(nine years' duration).

16 40		39 86	7 25										−7 25
11 94	10 78	61 57	11 19	0 40		6	9,240	10,440			128 45	23 36	12 17
14 45	9 88	62 33	11 35	0 25		6	8,408	11,872			95 85	17 43	6 08
8 21		45 61	8 49						11,145		55 72	10 13	1 92
3 77		36 61	6 65						5,920		29 60	5 38	−1 27
30 65		55 82	10 15						3,900		19 50	3 55	−6 60
20 45		75 47	13 72							70,832	106 25	19 32	5 60
11 04	10 36	59 11	10 75	0 40		6	8,880	10,560			123 68	22 48	11 75
14 03	12 96	66 33	12 06	0 20		6	11,016	14,784			124 94	22 72	10 66
130 94	43 98	502 71									683 99		
2 65	0 89		10 16									13 82	3 66

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SUMMARY of Profits of Rotations "C," "J," "P" and "R."

Rotation.	Profit per acre 1914.	Profit per acre Average for 3 years.
	$ c.	$ c.
"C" (three years' duration)	3 65	5 67
"J" (six years' duration)	6 38	10 05
"P" (eight years' duration)	4 46	8 50
"R" (nine years' duration)	3 66	7 80

SOIL CULTURAL EXPERIMENTS.

DEPTH OF PLOUGHING SUMMER-FALLOW TO BE SOWN TO WHEAT.

The soil in this experiment was ploughed in June at depths varying from 3 to 8 inches, and from 5 to 8 inches, with 4-inch sub-soiling. Immediately after ploughing the plots were subsurface packed and harrowed, and then cultivated throughout the season to keep down the weeds.

DEPTH of Ploughing Summer-fallow to be Sown to Wheat.

Plot No.	Depth of ploughing summer-fallow, 1913.	Days to mature.	Yield of wheat per acre, 1914.		Average for 3 years.	
			Bush.	Lb.	Bush.	Lb.
1	Ploughing 3 inches deep	117	34	..	34	10
2	Ploughing 4 inches deep	117	36	40	39	10
3	Ploughing 5 inches deep	117	36	..	39	10
4	Ploughing 6 inches deep	117	35	20	40	50
5	Ploughing 7 inches deep	117	34	40	41	20
6	Ploughing 8 inches deep	117	36	..	41	20
7	Ploughing 5 inches deep and subsoiling 4 inches	117	38	40	44	10
8	Ploughing 6 inches deep and subsoiling 4 inches	117	37	20	41	10
9	Ploughing 7 inches deep and subsoiling 4 inches	117	38	..	42	20
10	Ploughing 8 inches deep and subsoiling 4 inches	117	40	..	38	30

DEPTH OF PLOUGHING WHEAT STUBBLE TO BE SOWN TO OATS.

The wheat stubble of 1913, in the above experiment, was ploughed as in the table following for oats. The deep ploughing seems to have had more effect on the second crop than it had on the first, as will be noted from the following table:—

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DEPTH of Ploughing Wheat Stubble to be Sown to Oats.

Plot No.	Depth of ploughing summer-fallow for wheat, 1912.	Depth of ploughing wheat stubble fall of 1913.	Days to mature.	Yield of oats per acre, 1914.		Average for 3 years.	
				Bush.	Lb.	Bush.	Lb.
1	Ploughed 3 inches..........	Ploughed 3 inches deep......	93	43	18	74	14
2	Ploughed 4 inches..........	Ploughed 4 inches deep......	93	41	06	74	24
3	Ploughed 5 inches..........	Ploughed 5 inches deep......	93	49	14	74	24
4	Ploughed 6 inches..........	Ploughed 5 inches deep......	93	49	14	70	20
5	Ploughed 7 inches..........	Ploughed 5 inches deep......	93	47	02	75	..
6	Ploughed 6 inches..........	Ploughed 5 inches deep......	93	44	24	79	14
7	Ploughed 5 inches subsoiled 4 inches..........	Ploughed 5 inches deep......	93	51	26	79	29
8	Ploughed 6 inches subsoiled 4 inches..........	Ploughed 5 inches deep......	93	55	10	85	20
9	Ploughed 7 inches subsoiled 4 inches..........	Ploughed 5 inches deep......	93	61	06	87	17
10	Ploughed 8 inches subsoiled 4 inches..........	Ploughed 5 inches deep......	93	65	30	96	06

DEPTH OF PLOUGHING SOD.

This experiment is being conducted in a four year rotation of:—

First year.—Wheat.
Second Year.—Oats, seeded down with grass.
Third year.—Hay.
Fourth year.—Hay.

The following table gives the yield of wheat the first year and oats the second year, ploughed at varying depths:—

DEPTH of Ploughing Sod to be Sown to Wheat followed by Oats.

Plot No.	Depth of ploughing sod, 1913.	Days to mature	Yield per acre of wheat on sod.		Average.		Depth of ploughing wheat stubble for oats.	Days to mature	Yield of oats per acre on wheat stubble.		Average.	
			Bush.	Lb.	Bush.	Lb.			Bush.	Lb.	Bush.	Lb.
11	Ploughing 3 inches deep..........	118	28	..	25	..	Ploughing 3 inches deep..........	96	50	20	58	14
12	Ploughing 4 inches deep..........	118	22	..	24	20	Ploughing 4 inches deep..........	96	61	06	74	17
13	Ploughing 5 inches deep..........	118	26	40	26	33	Ploughing 5 inches deep..........	96	58	28	67	20
14	Ploughing 3 inches deep..........	118	23	20	24	33	Ploughing 6 inches deep..........	96	49	14	65	03

SUMMER-FALLOW TREATMENT.

The rotation used in this experiment is—
First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Oats.

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While the results from this experiment may seem at first glance to be more or less confusing, if they are carefully analysed some definite conclusions can be drawn. If the first three plots are considered as a definite experiment, it will be noticed that land ploughed between 6 and 8 inches deep in June gave best results. The number of times ploughed, including plots 4 to 9 and plot 12, would seem to indicate that two ploughings sometimes would give a higher yield than a single ploughing, but it is doubtful if the increased yield would pay for the extra ploughing. The result from plot 10 would seem to indicate that in some seasons where late fall pasture was required, it would be advisable to seed with rape. In plots 11 and 13, the benefits from early ploughing are evident. Fall cultivation and fall ploughing, as indicated in 14 and 15, increase the yield over plots 12 and 16.

TREATMENT of Summer-Fallow to be Sown to Wheat followed by Oats.

Plot No.	Treatment of summer-fallow, 1913.	Days to mature.	Yield of wheat per acre on summer-fallow.		Average for 3 years		Days to mature.	Yield of oats per acre following wheat.		Average for 3 years	
			Bush.	Lb.	Bush.	Lb.		Bush.	Lb.	Bush.	Lb.
1	Plough 4 inches June, pack if necessary and practicable, cultivate as necessary	114	42	40	41	30	92	64	24	90	30
2	Plough 6 inches June, pack if necessary and practicable, cultivate as necessary	114	45	20	45	40	92	67	02	92	02
3	Plough 8 inches June, pack if necessary and practicable, cultivate as necessary	114	44	40	45	40	92	82	12	98	18
4	Plough 4 inches June, cultivate. Plough 4 inches September, harrow.	114	46	40	46	20	92	62	12	99	24
5	Plough 6 inches June, cultivate Plough 6 inches September, harrow.	114	44	..	42	30	92	70	20	92	12
6	Plough 8 inches June, cultivate Plough 8 inches September, harrow.	114	44	..	44	..	92	61	06	89	14
7	Plough 6 inches June, cultivate Plough 4 inches September, harrow..	114	43	20	44	20	92	69	14	88	28
8	Plough 4 inches June, cultivate. Plough 6 inches September, harrow.	114	44	..	40	50	92	61	06	77	12
9	Plough 4 inches June, early as possible cultivate, plough 6 inches September, leave untouched	114	42	..	40	40	92	70	20	88	28
10	Plough 5 inches June seed to rape or other green forage crop and pasture off	114	46	..	39	30	92	70	20	92	32
11	Plough 6 inches May 15, harrow and pack if necessary, cultivate as necessary	114	45	20	43	30	92	63	18	91	21
12	Plough 6 inches June 15, harrow and pack if necessary cultivate as necessary	114	43	20	43	..	92	61	06	79	14
13	Plough 6 inches July 15, harrow and pack if necessary, cultivate as necessary	114	39	20	42	10	92	63	18	90	..
14	Fall cultivate before summer-fallowing plough 6 inches June, harrow and pack if necessary, cultivate as necessary	114	45	20	44	..	92	61	06	90	10
15	Fall plough 4 inches before summer-fallowing plough 6 inches June, harrow and pack if necessary, cultivate as necessary	114	41	20	42	20	92	61	06	88	23
16	Plough 6 inches June, pack, cultivate as necessary	114	42	40	42	50	92	70	20	87	22
17	Plough 6 inches June no packing, otherwise same as other plots..	114	45	20	42	40	92	70	20	93	28

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STUBBLE TREATMENT.

This experiment consists of ten different methods of treating stubble land for wheat, and three in treating stubble land for oats. It will be noticed that the results this season differ considerably from the average, which would seem to indicate that the method would have to be suited to the season.

TREATMENT of Wheat Stubble to be Sown to Wheat.

Plot No.	Treatment given wheat stubble preceding wheat.	Days to mature.	Yield of wheat per acre, 1914.		Average for 3 years.	
			Bush.	Lb.	Bush.	Lb.
1	Plough autumn	113	20	..	22	35
2	Disc harrow autumn	113	23	20	26	05
3	Burn stubble, then disc autumn	113	20	40	25	10
4	Burn stubble, then plough autumn	113	16	40	25	..
5	Burn stubble in spring, seed at once	113	16	40	25	15
6	Plough in spring, seed at once	113	16	..	27	15
7	Disc at cutting time, spring plough	113	16	..	27	55
8	Disc at cutting time, autumn plough	113	14	..	24	25
9	Plough autumn, subsurface pack at once	113	16	..	30	15
10	Plough spring, seed, subsurface pack	113	18	..	27	35

TREATMENT of Wheat Stubble to be Sown to Oats.

Plot No.	Treatment given wheat stubble preceding oats.	Days to mature.	Yield of oats per acre, 1914.		Average for 3 years.	
			Bush.	Lb.	Bush.	Lb.
11	Plough autumn, subsurface pack at once	95	44	24	68	28
12	Plough spring, seed, subsurface pack	95	44	24	73	08
13	Cultivate autumn, spring plough, seed	95	44	24	77	02

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SEEDING TO GRASS AND CLOVER.

The results from this experiment have given some valuable information. The yield of hay on summer-fallow and corn land with and without a nurse crop is not very different, but when the seed was put on stubble land the effect of the nurse crop was to greatly decrease the yield of grass.

SEEDING to Grass and Clover.

Plot No.	Method of seeding.	Yield of first year hay.	Average for 3 years.
		Tons. Lb.	Tons. Lb.
1	Seeding rye grass 10 pounds and red clover 10 pounds with nurse crop on summer-fallow	2 920	3 1,587
2	Seeding rye grass 10 pounds and red clover 10 pounds alone after summer-fallow	3 1,960	4 1,947
3	Seeding rye grass 10 pounds and red clover 10 pounds with nurse crop on first year after hoed crop	2 160	3 1,987
4	Seeding rye grass 10 pounds and red clover 10 pounds alone after hoed crop	2 1,200	3 1,067
5	Seeding rye grass 10 pounds and red clover 10 pounds with nurse crop on first year wheat stubble	1 1,080	3 027
6	Seeding rye grass 10 pounds and red clover 10 pounds alone after first year wheat	1 1,920	2 560
7	Seeding rye grass and red clover with oats to cut green on first year wheat stubble	1 560	2 1,653
8	Seeding rye grass 10 pounds and red clover 10 pounds alone on first year wheat stubble, manured 8 tons per acre, ploughed preceding fall	2 280	3 960
9	Seeding rye grass 10 pounds and red clover 10 pounds with nurse crop on second year wheat stubble	1 1,440	3 773
10	Seeding rye grass 10 pounds and red clover 10 pounds alone after second year grain oats	2 440	3 1,587
11	Seeding rye grass 10 pounds and red clover 10 pounds with nurse crop on second year after hoed crop	1 1,440	3 173

APPLICATION OF BARNYARD MANURE.

This experiment consists of applying barnyard manure at different times of the year on land prepared differently, and different methods of incorporating the manure with the soil for four of the most important crops.

APPLICATION OF BARNYARD MANURE FOR CORN.

In this experiment a three-year rotation was used:—

First year.—Corn.

Second year.—Wheat.

Third year.—Wheat.

The table shows the yield of corn and two succeeding crops of wheat and also the value of the crops per acre for the entire rotation. In computing the value of the crops, corn was valued at $3 per ton and wheat at 80 cents per bushel.

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APPLICATION of Barnyard Manure for Corn.

Plot No.	Application of manure.	Days to mature.	Yield of corn per acre, 1914.		Days to mature.	Yield of wheat per acre following corn, 1913.		Days to mature.	Yield of wheat per acre following wheat, 1913.		Value of crops per acre for entire rotation.	Average for three years.
			Tons.	Lb.		Bush.	Lb.		Bush.	Lb.	$ cts.	$ cts.
1	No manure, plough second-year stubble in, in autumn	88	3	..	114	22	40	112	26	40	48 48	76 49
2	Apply in autumn after ploughing second-year stubble work in at once	88	4	1,600	114	26	40	112	36	..	64 54	84 22
3	Apply in spring on autumn ploughed second-year stubble work in at once	88	3	1,600	114	22	..	112	31	20	54 07	78 44
4	Apply in autumn on second-year stubble, plough under in autumn	88	4	..	114	20	..	112	32	..	53 60	72 32
5	Apply in spring on second-year stubble, plough under in spring	88	3	..	114	18	40	112	34	..	51 14	75 21
6	Apply in winter on second-year stubble, plough under in spring	88	3	400	114	22	40	112	33	20	54 40	81 92
7	Apply, in winter, green manure (cut straw) on second-year stubble, plough under in spring	88	3	..	114	18	..	112	29	20	46 87	73 71
8	Apply, in winter, green manure (cut straw) on summer-fallow, disc in	88	2	800	114	20	..	......	....		23 20	58 21
9	Summer-fallow no manure	88	3	800	114	20	40	......	....		26 74	68 87

APPLICATION OF BARNYARD MANURE FOR WHEAT.

In this experiment a three-year rotation was also followed:—

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

In the following table the yield of wheat on the fallow and stubble land, and also the average yield per acre for the entire rotation is given.

APPLICATION of Barnyard Manure for Wheat.

Plot No.	Application of manure.	Days to mature.	Yield of wheat per acre on wheat stubble.		Days to mature.	Yield of wheat per acre on summer-fallow.		Value of crops per acre for entire rotation.		Average for three years.	
			Bush.	Lb.		Bush.	Lb.	$	cts.	$	cts.
1	Apply, in winter, green manure (cut straw) on first-year stubble, disc in..........	113	34	40	109	19	20	43	21	44	88
2	Apply, in winter, green manure (cut straw) on summer-fallow, disc in............	113	45	20	109	20	..	57	27	51	90
3	Top-dress, with spreader, grain sown on first-year stubble....................	113	40	40	109	16	40	45	88	54	48
4	Top-dress, with spreader, grain sown on summer-fallow..........................	113	38	..	109	14	40	42	14	48	44
5	No manure, plough first-year stubble in autumn..............................	113	38	40	109	20	..	46	94	48	79
6	Apply on first-year stubble, plough under in autumn...........................	113	46	40	109	20	..	53	34	59	46
7	Apply on first-year stubble, plough under in spring............................	113	46	40	109	23	20	56	00	52	98
8	No manure, disc first-year stubble, in autumn..............................	113	41	20	109	16	40	46	40	48	18
9	No manure, burn first-year stubble......	113	42	40	109	22	40	52	28	60	18

APPLICATION OF BARNYARD MANURE FOR BARLEY.

In this experiment the three-year rotation has been adopted:—

First year.—Summer-fallow.

Second year.—Wheat or barley, where indicated.

Third year.—Barley or oats, where indicated.

Where barley follows summer-fallow, oats follow barley. Owing to the different cropping systems, a comparison of all the methods of application is somewhat difficult. Plots 2 and 4, in which barley is sown on summer-fallow and followed by oats, must be considered separately. The value of the crops per acre for the entire rotation is arrived at by allowing barley at 48 cents per bushel, oats at 34 cents per bushel and wheat at 80 cents per bushel.

Application of Barnyard Manure for Barley.

Plot No.	Application of manure.	Days to mature.	Yield of wheat per acre on summer-fallow.		Days to mature.	Yield of barley per acre on wheat stubble.		Value of crops per acre for entire rotation.	Average for three years.
			Bush.	Lb.		Bush.	Lb.	$ cts.	$ cts.
1	Apply, in winter, green manure (cut straw) on first-year stubble, disc in...........	114	46	..	84	41	32	56 80	54 67
3	Top dress, with spreader, barley sown on first-year stubble.....................	114	46	..	84	42	24	57 20	60 62
5	No manure, plough first-year stubble in autumn..............................	114	40	40	84	40	..	51 74	56 69
6	Apply on first-year stubble, plough under in autumn..........................	114	47	20	84	37	24	55 87	59 21
7	Apply on first-year stubble, plough under in spring............................	114	47	20	84	37	24	55 87	55 91
8	No manure, disc first-year stubble in autumn..............................	114	40	..	84	33	16	48 00	52 50
9	No manure, burn first-year stubble.......	114	30	..	84	32	24	39 60	50 01

Application of Barnyard Manure for Barley.

Plot No.	Application of manure.	Days to mature.	Yield of barley per acre on summer-fallow.		Days to mature.	Yield of oats per acre on stubble.		Value of crops per acre for entire rotation.	Average for three years.
			Bush.	Lb.		Bush.	Lb.	$ cts.	$ cts.
2	Apply, in winter, green manure (cut straw) on summer-fallow, sow barley on summer-fallow.........................	84	51	32	92	44	24	40 00	49 87
4	Top-dress, with spreader, barley sown on summer-fallow........................	84	60	..	92	27	02	38 00	48 79

APPLICATION OF BARNYARD MANURE FOR OATS.

In this experiment a three-year rotation is also followed:—

First year.—Summer-fallow.

Second year.—Wheat or oats, as indicated.

Third year.—Oats or barley, as indicated.

As in the previous experiment, the different cropping systems followed make it necessary to consider plots 2 and 4 apart from the remainder. In order to make a clear comparison of the results of different methods of applying manure, the same valuations for wheat, oats and barley are used as in the previous experiment.

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APPLICATION of Barnyard Manure for Oats.

Plot No.	Application of manure.	Days to mature.	Yield of wheat per acre on summer-fallow.		Days to mature.	Yield of oats per acre on wheat stubble.		Value of crops per acre for entire rotation.		Average for three years.	
			Bush.	Lb.		Bush.	Lb.	$	cts.	$	cts.
1	Apply, in winter, green manure (cut straw) on first-year stubble, disc in...........	114	43	20	92	52	32	62	67	55	78
3	Top-dress, with spreader, oats sown on first-year stubble.....................	114	36	40	92	56	16	48	54	57	51
5	No manure, plough first-year stubble in autumn..............................	114	46	40	92	54	04	55	74	59	37
6	Apply on first-year stubble, plough under in autumn...........................	114	34	..	92	50	20	44	40	57	70
7	Apply on first-year stubble, plough under in spring..............................	114	39	20	92	52	32	49	47	59	64
8	No manure, disc first-year stubble in autumn..............................	114	30	40	92	31	26	35	34	57	03
9	No Manure, burn first-year stubble........	114	33	20	92	31	26	37	47	53	91

APPLICATION of Barnyard Manure for Oats.

Plot No.	Application of Manure.	Days to mature.	Yield of Oats per acre on summer-fallow.		Days to mature.	Yield of Barley per acre on oat stubble.		Value of crops per acre for entire rotation.		Average for three years.	
			Bush.	Lb.		Bush.	Lb.	$	cts.	$	cts.
2.	Apply, in winter, green manure (cut straw) on summer-fallow, sow oats on summer-fallow..................	92	76	16	84	30	00	40	40	43	86
4.	Top-dress, with spreader, oats sown on summer-fallow.......................	92	77	22	84	32	24	42	00	47	47

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GREEN MANURING.

The rotation followed is:—

First year.—Summer-fallow or green crop turned under.

Second year.—Wheat.

Third year.—Wheat.

Again, to be able to make a proper comparison, a value is placed on the oats and wheat. Oats are valued at 34 cents per bushel, and wheat at 80 cents per bushel.

GREEN Manuring for Wheat followed by Oats.

Plot No.	Treatment of land year previous to Wheat.	Days to mature.	Yield of Wheat per acre.		Days to mature.	Yield of Oats per Acre on wheat stubble.		Value of crop per acre for entire rotation.	Average for three years.
			Bush.	Lb.		Bush.	Lb.	$ cts.	$ cts.
1.	Summer-fallow	116	33	20	92	41	06	40 67	48 54
2.	Peas, ploughed under early in July	116	33	20	98	47	02	42 67	49 38
3.	Peas, ploughed under when in bloom	116	33	20	98	44	24	41 87	48 13
4.	Tares, ploughed under late July	116	38	40	98	47	02	46 94	52 41
5.	Summer-fallow, barnyard manure, 12 tons per acre, applied on summer-fallow	116	42	40	92	54	04	52 54	54 74
6.	Summer-fallow	116	34	00	92	47	02	43 20	51 66

SEED-BED PREPARATION.

This experiment is also carried on under a three-year rotation:

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Oats.

The land is summer-fallowed by ploughing in June, about 6 inches deep, packing, harrowing and cultivating as necessary throughout the season to keep down the weeds; the only difference in preparing the land for seed being in the following spring, when it is given the treatment as outlined in the table following:—

PREPARATION of Seed-bed for Wheat.

Plot No.	Preparation given.	Days to mature.	Yield of Wheat per acre, 1914.		Average.	
			Bush.	Lb.	Bush.	Lb.
1	"Poor" (harrowed only once)	114	43	20	35	06
2	"Good" (harrowed twice)	114	42	40	37	53
3	"Extraordinary" (harrowed three times and packed)	114	43	20	42	00

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PREPARING SEED-BED FOR OATS.

In preparing a seed-bed for oats, the land is fall ploughed, packed and harrowed. The following spring it is given the treatment as outlined in the table following:—

PREPARATION of Seed-bed for Oats.

Plot No.	Preparation given.	Days to mature.	Yield of Oats per acre, 1914.		Average.	
			Bush.	Lb.	Bush.	Lb.
1.....	" Poor " (harrowed twice)	92	62	12	77	02
2.....	" Good " (harrowed three times)	92	65	30	74	30
3.....	" Extraordinary " (harrowed four times and packed)	92	68	08	86	09

SOIL PACKERS.

In this experiment a three-year rotation is also followed:—

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat.

In the third year, plots 1 to 11 are ploughed in the spring, while plots 11 to 25 are ploughed in the fall. From a careful analysis of this table it will be found that the subsurface packer gives best results when used immediately after the plough, and the surface packer when used immediately after the seeder. The harrow after the packer has also increased the yield.

SOIL PACKING for Wheat following Summer-fallow.

Plot No.	Cultural Treatment given.	Days to mature.	Yield of Wheat per acre, 1914.		Average.	
			Bush.	Lb.	Bush.	Lb.
1.....	Harrow, seed	111	36	40	39	30
2.....	" " surface pack	111	43	20	41	00
3.....	" " " harrow	111	47	20	41	00
4.....	" " subsurface pack	111	40	40	40	45
5.....	" " " harrow	111	46	00	43	10
6.....	" " combination pack	111	34	40	39	35
7.....	" " " harrow	111	34	00	39	55
8.....	Surface pack, seed, surface pack	111	34	40	43	30
9.....	Subsurface pack, seed, subsurface pack	111	40	00	46	40
10.....	Combination pack, seed, combination pack	111	40	00	47	10
11.....	Surface pack, harrow, seed	111	34	40	46	20
12.....	Subsurface pack, harrow, seed	111	36	40	44	00
13.....	Combination pack, harrow, seed	111	36	40	43	50
14.....	Harrow, seed	111	31	20	39	30
15.....	Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed	111	36	40	42	00
16.....	Plough for summer-fallow, subsurface, pack, cultivate; next spring, smoothing harrow, seed	111	38	00	44	20
17.....	Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed	111	39	20	43	00
18.....	Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed, surface pack	111	36	40	42	20
19.....	Plough for summer-fallow, subsurface pack, cultivate; next spring smoothing harrow, seed, subsurface pack	111	40	00	52	00
20.....	Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed, combination pack	111	40	00	49	30
21.....	Harrow, seed	111	36	40	49	30
22.....	" " harrow when 6 inches high	111	38	40	48	30
23.....	" " surface pack when 6 inches high	111	38	40	45	50
24.....	" " roll when 6 inches high	111	40	00	45	40
25.....	" "	111	39	20	46	30

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SOIL PACKING for Wheat Sown on Spring and Fall Ploughed Stubble Land.

Plot No.	Cultural Treatment given.	Days. to mature.	Yield of Wheat per acre, 1914.		Average.	
	Spring Ploughed.		Bush.	Lb.	Bush.	Lb.
1.....	Harrow, subsurface pack, harrow, seed..................	113	26	40	29	35
2.....	" surface pack, harrow, seed..........................	113	28	00	35	15
3.....	" combination pack, harrow, seed......................	113	32	00	39	15
4.....	" subsurface pack, harrow, seed, subsurface pack........	113	24	40	35	55
5.....	Harrow, surface pack, harrow, seed, surface pack.............	113	31	20	41	25
6.....	Harrow, combination pack, harrow, seed, combination pack....	113	32	40	42	15
7.....	" seed, harrow..	113	25	20	32	05
8.....	" seed, surface pack..................................	113	20	40	32	05
9.....	" seed, subsurface pack...............................	113	32	00	37	45
10.....	" seed, combination pack..............................	113	29	20	34	55
11.....	Harrow, seed..	113	28	00	30	25
	Fall Ploughed.					
12.....	No packer, harrow, seed..................................	113	32	00	30	15
13.....	Subsurface pack in fall, seed in spring......................	113	30	40	27	55
14.....	Subsurface pack in spring, then seed......................	113	26	40	20	46
15.....	Subsurface pack in spring, after seeding.....................	113	32	00	24	20
16.....	Surface pack in fall, seed in spring.......................	113	39	20	32	13
17.....	Surface pack in spring, then seed.........................	113	33	20	29	35
18.....	Surface pack in spring, after seeding......................	113	28	00	30	25
19.....	Combination pack in fall, seed in spring	113	39	20	37	50
20.....	Combination pack in spring, then seed.....................	113	28	00	37	55
21.....	Combination pack in spring, after seeding..................	113	30	40	37	00
22.....	No packer, harrow, seed..................................	113	26	40	31	45
23.....	Surface pack in fall, seed, surface pack..................	113	25	20	32	35
24.....	Subsurface pack in fall, subsurface pack..................	113	28	00	30	55
25.....	Combination pack in fall, seed, combination pack.............	113	28	00	29	35

DEPTH OF SEEDING.

This experiment is conducted on a three-year rotation:—

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Oats.

The first year wheat stubble is ploughed in the fall and then packed and harrowed.

DEPTH of Seeding Wheat.

Plot No.	Depths sown.	Days to mature.	Yield of wheat per acre, 1914.		Average.	
			Bush.	Lb.	Bush.	Lb.
1	1 inch deep............................	117	32	40	43	35
2	2 inches deep............................	117	28		43	40
3	3 inches deep............................	117	38		44	15
4	4 inches deep............................	117	34		44	15

Depth of Seeding Oats.

Plot No.	Depths sown.	Days to mature.	Yields of oats per acre, 1914.		Average.	
			Bush.	Lb.	Bush.	Lb.
1	1 inch deep	94	62	12	81	06
2	2 inches deep	94	64	24	81	16
3	3 inches deep	94	50	20	85	18
4	4 inches deep	94	48	08	85	30

COMMERCIAL FERTILIZERS.

In the spring of 1914 the commercial fertilizers in the following experiments were applied on summer-fallow land, and all planted to corn. The frost of August 9, which completely killed the corn, would to a certain extent affect the yield; however, the comparision should still be useful. It will be noted that the yield has been slightly increased by the use of the different fertilizers.

Commercial Fertilizers.

Plot No.	Fertilizer Treatment.	Yield of corn per acre.	
		Tons.	Lb.
1	Check. No fertilizer	7	1,200
2	N. Eight pounds nitrate of soda	8	1,600
3	P_2O_5. Fifteen pounds Super hosphate	9	1,200
4	K_2O. Five pounds muriate of potash	8	1,600
5	Check. No fertilizer	8	400
6	N. P_2O_5 K_2O	10	400
7	N. P_2O_5	9	
8	N. K_2O	8	800
9	P_2O_5 K_2O	7	
10	Check. No fertilizer	6	400
11	Basic Slag, 25 pounds	6	1,600
12	Clover in place of grass	5	1,600
13	Clover in place of grass	6	800
14	Barnyard manure, 16 tons per annum	6	1,200
15	Barnyard manure, 8 tons per annum	6	400
16	Check. No fertilizer	4	1600

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UNDERDRAINING.

In this experiment the regular one-fortieth acre plots are used. The plots are 16 feet wide and drains in plots 3 and 7 run under the centre of the plots. These drains did not discharge any water of any account during the summer, as the season was very dry.

UNDERDRAINING.

Plot No.	—	Days.	Yield of wheat per acre.	
			Bush.	Lb.
1	No drainage	116	36	
2	No drainage	116	40	
3	Well 4 feet by 4 feet by 6 feet deep, drain 3 feet deep	116	40	40
4	No drainage	116	40	40
5	No drainage	116	39	20
6	No drainage	116	40	
7	Well 4 feet by 4 feet by 6 feet deep, drain 4 feet deep	116	38	
8	No drainage	116	37	20
9	No drainage	116	35	20

DRAINING.

A large slough in the centre of one of the fields was drained last season by digging a ditch shallow and wide so that the farm machinery could be driven through it. This ditch was dug with the ordinary road grader and gas tractor. It would seem to be an economical method of draining these low places in the Farm.

COUCH GRASS ERADICATION.

Three methods of eradicating couch grass were started in 1914. Field No. 1 was ploughed about 7 inches deep the first week in June, packed, harrowed, and seeded with barley at the rate of 3 bushels per acre. Field No. 2 was ploughed as for summer-fallow in early July, about 6 inches deep, and cultivated and disced throughout the season to keep the grass from growing. Field No. 3 was seeded down, and it was the intention to take hay off, pasture this summer and break it up the following season by ploughing in June and back-setting. In field No. 1 little success can be reported, as the season was so dry the barley did not germinate quickly and the grass in many places crowded it out. In field No. 2 a large amount of roots was gathered off and burned up, and in the fall practically no green grass could be seen.

ROADMAKING.

The plank road-drag was again used on the farm roads and driveway this season. By the use of this and the ordinary drag harrow the roads were kept in fair condition throughout the whole summer.

SHELTERING MACHINERY.

As it was necessary to purchase some new machinery, an experiment was planned whereby two machines exactly alike were purchased. One of these was kept under shelter when not in use and the other was left outside. An account was opened for each machine, showing the number of hours it had operated, number of acres worked, and also the amount of repairs required. At the end of ten years some valuable information should be gleaned from this experiment.

EXPERIMENTAL STATION FOR CENTRAL SASKATCHEWAN, ROSTHERN, SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO, B.A., B.S.A.

WEATHER CONDITIONS.

The season of 1914 opened favourably, and seeding was completed in good time. Growth was excellent until the middle of June, and crops promised a higher yield than the average. However, the drought of June and July affected all crops, especially those put in under any but the most favourable conditions, and at harvest time much of the grain was so poorly developed that it was not cut.

In order to illustrate the relation and importance of the amount of precipitation, during June and July especially, to the yield of grain, records are given for the past four seasons. From the table it will be noted that the precipitation during the growing season of 1914 was much below the average, which caused the correspondingly low yield of grain.

PRECIPITATION for the past four Growing Seasons, April 1 to August 15.

Month.	Year.				Average 4 years.
	1911	1912	1913	1914	
	Inches.	Inches.	Inches.	Inches.	Inches.
April	0·86	0·67	0·26	0·63	0·61
May	2·38	2·15	1·26	1·96	1·94
June	3·55	2·81	1·87	2·00	2·56
July	2·89	5·25	3·80	1·40	3·33
August	0·43	0·23	2·24	0·13	0·76
Total	10·11	11·11	9·43	6·12	9·20

WEATHER OBSERVATIONS taken at Rosthern, Experimental Station, 1914.

Month.	Temperature F.			Total Precipitation.	Total Sunshine.
	Highest.	Lowest.	Mean.		
	°	°	°	Inches.	Hours.
January	35·5	—27·8	1·5	0·65	97·9
February	39·0	—47·6	—11·05	0·00	146·9
March	42·3	—15·9	17·9	0·55	149·1
April	69·1	5·3	35·8	0·63	209·7
May	80·1	22·2	49·8	1·96	264·3
June	84·2	33·3	58·7	2·00	308·3
July	93·8	41·2	67·5	1·40	339·6
August	87·0	32·8	60·0	1·12	273·9
September	79·3	30·1	50·9	0·97	203·0
October	81·2	16·7	42·5	1·57	145·7
November	49·9	—20·0	21·7	1·20	100·0
December	23·8	—31·8	1·1	0·52	49·5
Total				12·57	2,287·9
Average for years 1911-12-13				17·47	2,135·9
Total for six growing months, April to September				8·08	1,598·8
Average for six growing months, 1911-12-13				14·25	1,414·

ROSTHERN.

ROTATION OF CROPS.

Four rotations have been in operation at this station since 1911. The area of each field is 2 acres, and a careful record is kept of the cost to operate, including seed and fertilizer applied, as well as the value of the returns in grain, hay and roots.

The field conditions are as nearly like those of the ordinary farm as is possible under our circumstances, and the results are approximately what an average farmer might expect on his own farm. Following the outline of the rotations, a tabular record is herewith given for all the rotations now in operation. The fixed values used in calculating the results are given on page 245 of this report.

ROTATION "C" (THREE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

This is a three-year rotation which is inexpensive to operate, as grain only is grown, and nothing else in the nature of fertilizer is added. Such a rotation is only recommended for new, clean, rich land, and cannot be carried on indefinitely because it will deplete the soil of fertility, and also will not keep weeds under control.

ROTATION "J" (SIX YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

Fourth year.—Oats, seeded down.

Fifth year.—Hay.

Sixth year.—Pasture.

This rotation could be used to advantage by the farmer beginning live-stock raising, as hay and oats are provided for feed, and wheat for sale. A small amount of manure is returnable to the soil but as no hoed crops are included in the rotation it will be difficult to control weeds.

ROTATION "P" (EIGHT YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat or coarse grain.

Fourth year.—Summer-fallow.

Fifth year.—Hoed crops or legumes.

Sixth year.—Barley. Seeded down.

Seventh year.—Hay.

Eighth year.—Pasture.

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This is a mixed-farming rotation, and as yet involves too many fields for the average farmer of this district. This difficulty could be overcome, however, by a slight re-arrangement of the rotation wherein the crops would succeed each other as follows: summer-fallow; hoed and legume crops; wheat; wheat, oats, or barley, seeded down; hay; hay.

ROTATION "R" (NINE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Hoed crops or legumes manured at the rate of 15 tons per acre.

Third year.—Wheat.

Fourth year.—Oats.

Fifth year.—Summer-fallow.

Sixth year.—Wheat.

Seventh year.—Oats, seeded down.

Eighth year.—Hay.

Ninth year.—Pasture.

This rotation, like the previous one, includes every crop required for mixed farming purposes, and presents the same difficulty in that it extends over too many years and involves too many fields. These present drawbacks should be eliminated as mixed farming becomes more prominent.

ROSTHERN.

.ROTATION "C"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Acres.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
2nd...	Fallow.........	Wheat.........	2	4 00	6 24	2	38	......	$1\frac{3}{4}$	$7\frac{1}{2}$	2	......
3rd...	Wheat.........	Wheat.........	2	4 00	6 06	2	38	......	$1\frac{3}{4}$	7	2	......
1st...	Wheat.........	Fallow.........	2	4 00	1 20	......	......	......	$1\frac{1}{2}$	$9\frac{3}{4}$	1	......
Aggregate......			6	12 00	13 50	4	76	......	5	$24\frac{1}{4}$	5	......
Average per acre......			......	2 00	2 25	·66	13	......	·83	4·04	·83	......

ROTATION "J"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
4th...	Wheat.........	Oats.........	2	4 00	6 40	4	76	......	3	$2\frac{1}{2}$	1	......
5th...	Oats.........	Hay.........	2	4 00	7 70	4	76	......	3	......	......	......
6th...	Hay.........	Hay.........	2	4 00	7 70	4	76	......	3	5	1	......
1st...	Hay.........	Fallow.........	2	4 00	1 20	......	......	......	......	11	1	......
2nd...	Fallow.........	Wheat.........	2	4 00	6 18	......	......	......	$2\frac{3}{4}$	$6\frac{1}{2}$	1	......
3rd...	Wheat.........	Wheat.........	2	4 00	6 12	$2\frac{1}{2}$	48	......	$2\frac{3}{4}$	$6\frac{3}{4}$	2	......
Aggregate......			12	24 00	35 30	14·5	2 76	......	14·5	31·75	6	......
Average per acre......			......	2 00	2 94	1·2	23	......	1·21	2·65	·5	......

ROTATION "P"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
4th...	Wheat.........	Fallow.........	2	7 33	1 20	......	......	......	......	10·5	1	......
5th...	Fallow.........	Roots.........	2	7 33	5 65	237	45 03	5	5·5	1	1	
6th...	Roots.........	Barley.........	2	7 33	5 80	3	57	......	2	6	1	......
7th...	Barley.........	Hay.........	2	7 33	8 06	3	57	......	......	1·75	......	......
8th...	Hay.........	Hay.........	2	7 33	7 70	1	19	......	2·75	4·5	1	......
1st....	Hay.........	Fallow.........	2	7 33	1 20	......	......	......	......	10·25	1	......
2nd..	Fallow.........	Wheat.........	2	7 33	6 18	2	38	......	1·75	7·5	1	......
3rd...	Wheat ...	Wheat.........	2	7 33	6 18	2	38	......	1·75	7·0	2	......
Aggregate......			16	58 64	41 97	248	47 12	5	13·75	48·50	8	......
Average per acre......			......	3 66	2 62	15·5	2 95	·31	·86	3·03	·5	......

ROTATION "R"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
4th...	Wheat.........	Oats.........	2	7 33	6 68	2	38	......	1·75	7·5	2	......
5th...	Oats.........	Fallow.........	2	7 33	1 20	......	......	......	......	9·75	2	......
6th...	Fallow.........	Wheat.........	2	7 33	6 18	2	38	......	1·75	7·5	1	......
7th...	Wheat	Oats.........	2	7 33	6 62	3	57	......	2	6·25	1	......
8th...	Oats.........	Hay.........	2	7 33	7 70	5	95	......	3	......	......	......
9th...	Hay.........	Hay.........	2	7 33	7 70	5	95	......	3·5	4·5	1	......
1st...	Hay.........	Fallow.........	2	7 33	1 20	......	......	......	......	11·25	1	......
2nd...	Fallow.........	Corn.........	2	7 33	5 55	84	15 96	4·5	2	9·0	1	......
3rd...	Corn.........	Wheat.........	2	7 33	6 18	2	38	......	1·75	6·0	3	......
Aggregate......			18	65 97	49 01	103	19 57	4·5	15·75	61·75	12	......
Average per acre......			......	3 67	2 72	5·7	1 08	·25	·87	3·43	·66	......

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(Three years' duration).

In raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cents	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
4 62	4 55	19 79	9 89	30·3			3,912	5,114			54 56	27 28	17 39
4 42	2 90	17 76	8 88	42·8			2,493	4,727			35 56	17 78	8 90
4 99		10 19	5 10										−5 10
14 03	7 45	47 74									90 12		
2 34	1 24		7 96									15 02	7 06
(Six years' duration).													
2 52	3 28	16 96	8 48	20·7			2,797	4,253			32 13	16 07	7 59
68		13 14	6 57		2 92				2,250		11 25	5 63	− 94
4 55		17 01	8 50						2,440		12 20	6 10	−2 40
4 99		10 19	5 10										−5 10
3 68	4 18	18 04	9 02	30			3,584	4,410			50 00	25 00	15 98
4 58	2 31	17 49	8 75	56			1,987	3,825			28 31	14 15	5 40
21 00	9 77	92 83									133 89		
1 75	81		7 73									11 16	3 43
(Eight years' duration.)													
4 78		13 31	6 65										−6 65
4 11		62 12	31 06							46,228	69 34	34 67	3 61
3 62	3 78	21 10	10 55	27·2			3,622	8,498			45 70	22 85	12 30
72		16 68	8 34		3 70				4,508		22 54	11 27	2 93
3 25		18 47	9 24		10 53				3,590		17 95	8 97	−0 27
4 68		13 21	6 60										−6 60
4 11	3 75	21 75	10 88	40			3,219	4,411			44 85	22 85	11 97
4 43	2 38	20 70	10 35	60·3			2,035	4,950			29 68	14 84	4 49
29 70	9 91	187 34									230 06		
1 86	62		11 71									14 43	2 72
(Nine years' duration.)													
4 56	4 80	23 75	11 87	19·8			4,084	4,360			45 20	22 60	10 73
4 95		13 48	6 74										−6 74
4 14	4 62	22 65	11 32	34·3			3,964	5,325			55 30	27 65	16 33
3 72	3 92	22 16	11 08	22·6			3,334	4,570			37 82	18 91	7 83
1 02		17 00	8 50						4,538		22 69	11 35	2 85
3 51		19 49	9 75						3,020		15 10	7 55	−2 20
5 09		13 62	6 81										−6 81
6 07		34 91	17 45							17 920	26 88	13 44	−4 01
4 50	5 32	23 71	11 86	31·2			4,547	8,023			64 81	32 40	20 54
37 56	18 66	190 77									267 80		
2 09	1 03		10 59									14 87	4 28

ROSTHERN.

CULTURAL INVESTIGATION WORK.

The following are the results of the various soil cultural experiments under way:—

PRAIRIE BREAKING.

In this experiment, five plots are broken each year according to the directions given below. The sequence of the crops is as follows:—

First year.—Broken and treated as indicated below.
Second year.—Wheat.
Third year.—Wheat.
Fourth year.—Summer-fallow.
Fifth year.—Wheat.

BROKEN 1911-12-13.

Plot No.	Treatment when breaking.	Broken in 1911.		Broken in 1912.		Broken in 1913.
		Yield of wheat per acre.				
		1912.	1913.	1913.	1914.	1914.
		Lb.	Lb.	Lb.	Lb.	Lb.
1	Plough 3 inches to 4 inches early spring, pack, double-disc, harrow, double-disc, sow to peas and oats....	2,040	1,680	3,120	1,380	1,500
2	Plough 3 inches to 4 inches early spring, pack, double-disc, harrow, double-disc, sow to flax.............	2,000	2,080	2,480	1,960	1,220
3	Plough 3 inches to 4 inches early spring, pack, double-disc, harrow, sow to flax............................	1,680	2,280	2,280	1,240	1,400
4	Break early June, 4 inches to 5 inches, keep cultivated from day broken..................................	2,440	1,880	2,360	1,620	1,840
5	Break early June, 2 inches to 3 inches, roll, backset early September, keep cultivated from day broken.	2,160	2,960	2,220	1,500	1,780

DEPTH OF PLOUGHING WHEAT STUBBLE TO BE SOWN TO OATS.

The wheat stubble was ploughed in the spring of 1913 for the oat crop of 1913, and another set of plots in the spring of 1914 for the oat crop of 1914.

DEPTH of Ploughing Wheat Stubble to be Sown to Oats.

Plot No.	Depth of Ploughing.	Yield of Oats per acre 1913.	Yield of Oats per acre 1914.
		Lb.	Lb.
1	Ploughed 3 inches deep...	3,400	1,960
2	" 4 " "	3,440	2,120
3	" 5 " "	4,160	2,072

ROSTHERN.

DEPTH OF PLOUGHING SUMMER-FALLOW TO BE SOWN TO WHEAT.

The summer-fallow for the crop of 1913 was ploughed on June 8, 1912, and for the crop of 1914 on June 2, 1913.

DEPTH of Ploughing Summer-Fallow to be Sown to Wheat.

Plot No.	Depth of Ploughing Summer-fallow.	Yield of wheat per acre 1913.	Yield of wheat per acre 1914.
		Lb.	Lb.
1	Ploughed 3 inches deep	2,080	1,600
2	" 4 " "	2,160	1,720
3	" 5 " "	2,240	1,560
4	" 6 " "	2,360	1,440
5	" 7 " "	2,280	1,460
6	" 8 " "	2,400	1,500
7	" 5 " " and subsoiled 4 inches	2,600	1,600
8	" 6 " " " " 4 "	2,560	1,680
9	" 7 " " " " 4 "	2,840	1,620
10	" 8 " " " " 4 "	2,600	1,780

DEPTH OF PLOUGHING SOD.

Western rye grass sod was ploughed July 19, 1912, for a crop of wheat in 1913, and on August 7 for crop of 1914.

DEPTH of Ploughing Sod to be Sown to Wheat.

Plot No.	Depth of Ploughing Sod.	Yield of wheat per acre 1913.	Yield of wheat per acre 1914.
		Lb.	Lb.
1	Ploughed 3 inches deep	2,440	920
2	" 4 " "	2,640	940
3	" 5 " "	2,480	1,060

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SUMMER-FALLOW TREATMENT.

Seventeen plots were summer-fallowed as given below and sown to wheat followed by oats.

TREATMENT of Summer-fallow to be Sown to Wheat Followed by Oats.

Plot No.	Treatment of summer-fallow previous to wheat.	Yield per Acre.				
		Wheat 1912.	Oats 1913.	Wheat 1913.	Oats 1914.	Wheat 1914.
		Lb.	Lb.	Lb.	Lb.	Lb.
1	Plough 4 inches, June, pack if necessary and practicable, cultivate as necessary	2,820	3,080	2,000	2,800	1,900
2	Plough 6 inches, June, pack if necessary and practicable, cultivate as necessary	2,640	4,120	2,320	2,580	1,940
3	Plough 8 inches, June, pack if necessary and practicble, cultivate as necessary	2,080	4,200	2,240	2,900	2,040
4	Plough 4 inches, June, cultivate. Plough 4 inches, September, harrow	2,040	4,320	2,000	2,460	1,980
5	Plough 6 inches, June, cultivate. Plough 6 inches, September, harrow	2,160	3,800	1,920	2,460	1,800
6	Plough 8 inches, June, cultivate. Plough 8 inches, September, harrow	2,160	4,240	1,920	2,700	1,640
7	Plough 6 inches, June, cultivate. Plough 4 inches, September, harrow	1,960	3,400	1,920	3,160	1,680
8	Plough, 4 inches, June cultivate. Plough 6 inches, September, harrow	2,280	4,280	1,680	2,520	1,560
9	Plough 4 inches, June, early as possible, cultivate. Plough 6 inches September	2,840	4,000	1,560	2,500	1,920
10	Plough 5 inches, June, seed to rape or other green forage crop and pasture off	1,880	3,720	1,280	2,420	1,880
11	Plough 6 inches, May 15 harrow and pack if necessary, cultivate as necessary	2,200	4,040	2,240	2,620	2,020
12	Plough 6 inches, June 15, harrow and pack if necessary, cultivate as necessary	2,640	4,080	2,400	2,920	2,320
13	Plough 6 inches, July 15, harrow and pack if necessary, cultivate as necessary	2,400	3,800	2,440	3,060	2,200
14	Fall cultivate before summer-fallowing. Plough 6 inches, June, harrow and pack	2,280	4,000	2,600	3,360	2,320
15	Fall plough 4 inches before summer-fallowing. Plough 6 inches, June, harrow and pack	2,640	3,800	2,680	3,040	2,200
16	Plough 6 inches June, pack, cultivate as necessary	2,560	3,680	2,440	2,940	2,080
17	Plough 6 inches, June, no packing, otherwise same as other plots	2,600	3,880	2,680	3,020	2,120

ROSTHERN.

GREEN MANURING.

This experiment shows more than any other at the Station the beneficial effect of barnyard manure. Throughout the season, plot 5, on which barnyard manure was applied for wheat, stood from 2 to 4 inches higher than the other plots, and a similar advantage was noted on the succeeding oat crops.

Green Manuring for Wheat followed by Oats.

Plot No.	Treatment of land year previous to wheat.	Yield per Acre.				
		Wheat 1912.	Oats. 1913.	Wheat. 1913.	Oats. 1914.	Wheat. 1914.
		Lb.	Lb.	Lb.	Lb.	Lb.
1	Summer-fallow	2,400	3,200	2,720	2,380	1,840
2	Peas, ploughed under early in July	2,320	3,680	2,680	2,200	1,820
3	Peas, ploughed under when in bloom	2,000	3,880	2,440	2,160	1,720
4	Tares, ploughed under late July	2,800	4,440	2,520	2,120	1,560
5	Summer-fallow, barnyard manure 12 tons per acre applied on summer-fallow in September	3,440	4,800	3,680	2,380	2,300
6	Summer-fallow	2,480	4,000	2,280	2,140	1,780

DEPTHS OF SEEDING.

Oats and wheat were sown at depths varying from 1 to 4 inches.

Depths of Seeding Wheat.

Plot No.	Depth Sown.	Yield of Wheat per acre.	
		1913.	1914.
		Lb.	Lb.
1	1 inch deep	2,720	1,720
2	2 inches deep	2,760	1,340
3	3 " "	2,560	1,800
4	4 " "	2,120	1,920

Depths of Seeding Oats.

Plot No.	Depth Sown.	Yield of Oats per acre.	
		1913.	1914.
		Lb.	Lb.
1	1 inch deep	3,800	3,040
2	2 inches deep	3,600	3,000
3	3 " "	4,320	3,920
4	4 " "	4,360	1,960

Rosthern.

EXPERIMENTAL STATION FOR NORTHWESTERN SASKATCHEWAN, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

WEATHER AND CROP CONDITIONS, 1914.

The summer of 1914 has been one of the most disastrous to crop production that this section of Saskatchewan has ever experienced. Less rain than usual fell during the summer of 1913, and very little snow fell during the winter of 1913-14. This left the soil with a small amount of moisture to withstand the severe drought to which it was subjected during the past season. The drought, together with the winds which prevailed during the latter part of July, hastened the crops to maturity, the first grain being cut on July 31. The light harvest, while delayed considerably by the August and September rains, was threshed in sufficient time to allow for a much larger acreage of fall-ploughing than usual, before the ploughs were stopped, on November 5, by the frost.

Some Weather Observations taken at Scott Experimental Station, 1914.

Month.	Temperature F.			Precipitation.			Heaviest in 24 hours.	Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall	Total.		
	°	°	°	Inches.	Inches.	Inches.	Inches.	hours.
January	1·91	38·0	—40·1	....	....	·65	....	96·6
February	5·70	37·2	—46·6	....	....	·03	....	128·5
March	19·37	44·0	—21·9	....	....	·20	....	157·9
April	37·8	76·5	9·1	1·36	....	1·36	·48	184·5
May	49·0	82·0	18·4	1·05	1·0	1·15	·22	295·4
June	56·9	85·0	34·1	2·37	....	2·37	·46	211·0
July	67·0	96·8	35·2	1·80	....	1·80	·95	309·0
August	59·5	90·5	30·0	1·41	....	1·41	·55	235·1
September	55·2	80·0	28·2	3·46	....	3·46	2·20	192·8
October	41·13	70·1	18·2	3·17	....	3·17	1·75	143·7
November	23·69	51·8	—17·3	....	6·0	·60	·60	100·4
December	2·57	24·8	—23·3	....	18·0	1·80	·60	26·3
Total for year	....	....	....	14·62	....	18·00	....	2,081·2
Total for six growing months, April to September				....	....	11·55	....	1,427·8

FIELD CROP YIELDS.

Variety.	Area.	Yield per acre
	Acres.	Bush.
Wheat—		
Marquis	16	14
Pioneer	4	14
Prelude	4	11·6
Oats—		
Victory	1	39·5
Barley—		
O. A. C. No. 21	1	17
Peas—		
Arthur	4·7	22

COST OF PRODUCTION OF FIELD CROPS.

The investigation into the cost of producing field crops has been continued this past year. In computing the cost of production, fixed values, as outlined on page 245 of this report have been used.

COST OF PRODUCING WHEAT ON PLOT "A."

Wheat is grown on this plot continuously.

Number of acres, 1.	
Rent of land at $2 per acre	$ 2 00
Ploughing in fall, 2⅔ hours, 4-horse team at 48 cents per hour	1 28
Packing after ploughing, ⅔ hour, 2-horse team at 34 cents per hour	23
Harrowing after packing, ¼ hour, 4-horse team at 48 cents per hour	12
Harrowing in spring, ½ hour, 4-horse team at 48 cents per hour	24
Seed, 1¾ bushels at 85 cents per bushel	1 50
Sowing, 1 1/12 hours, 2-horse team at 34 cents per hour	37
Packing after seeding, 7/12 hour, 2-horse team at 34 cents per hour	20
Harrowing after packing, ¼ hour, 4-horse team at 48 cents per hour	12
Cutting, 1 hour, 4-horse team at 48 cents per hour	48
Twine, 30 cents per acre	30
Use of machinery, 60 cents per acre	60
Stooking, 1 hour manual labour at 19 cents per hour	19
Threshing, 4 bushel of grain at 7 cents per bushel	28

Yield of grain per acre 231 pounds. Yield of straw per acre 1,239 pounds.
Total cost of produce (3·85 bushels of grain), (1,239 pounds of straw), $7.91.
Cost to produce 1 bushel of grain, $1.98.
Cost to produce 1 ton of straw, $12,77.

COST OF PRODUCING WHEAT ON ROTATION "C."

This is a three-year rotation: first year, summer-fallow; second year, wheat; third year, wheat.

Year 2.—Wheat after Summer-fallow.

Number of acres, 1½.	
Rent of land at $2 per acre	$3 00
Harrowing in spring, 1 hour, 4-horse team at 48 cents per hour	48
Seed, 2⅝ bushels at 85 cents per bushel	2 25
Sowing, 1⅝ hours, 2-horse team at 34 cents per hour	56
Packing after seeding, ⅝ hours, 2-horse team at 34 cents per hour	22
Harrowing after grain was up, ⅓ hour, 4-horse team at 48 cents per hour	16
Cutting, 1 1/6 hours, 4-horse team at 48 cents per hour	56
Twine, at 30 cents per acre	45
Use of machinery at 60 cents per acre	90
Stooking, ⅝ hour, manual labour at 19 cents per hour	16
Threshing, 24 bushels at 7 cents per bushel	1 68

Yield of grain per acre, 966 pounds; yield of straw per acre, 1,271 pounds.
Total cost of produce (24 bushels of grain), (1,906 pounds of straw), $10.42.
Cost to produce 1 bushel of grain, 43 cents.
Cost to produce 1 ton of straw, $10.98.

SCOTT.

COST OF PRODUCING WHEAT ON ROTATION "C"—*Concluded.*

Year 3.—Wheat after Wheat.

Number of acres, 1½.	
Rent of land at $2 per acre..	$ 3 00
Ploughing in fall, 3½ hours, 4-horse team at 48 cents per hour..	1 68
Harrowing in spring, ⅔ hour, 4-horse team at 48 cents per hour..	32
Seed, 2⅝ bushels at 85 cents per bushel..	2 25
Sowing, 7/12 hour, 2-horse team at 34 cents per hour..	54
Packing after seeding, ¾ hour, 2-horse team at 34 cents per hour..	25
Cutting, 1½ hours, 4-horse team at 48 cents per hour..	72
Twine, 30 cents per acre..	45
Use of machinery, 60 cents per acre..	90
Stooking, ⅝ hour manual labour at 19 cents per hour..	16
Threshing, 16⅔ bushels at 7 cents per bushel..	1 15
Yield of grain per acre, 669 pounds; yield of straw per acre, 951 pounds.	
Total cost of produce, (16⅔ bushels grain), (1,426 pounds straw), $11.42.	
Cost to produce 1 bushel of grain, 68 cents.	
Cost to produce 1 ton of straw, $16.02.	

COST OF PRODUCING WHEAT ON ROTATION "J."

This is a six-year rotation: first year, summer-fallow; second year, wheat; third year, wheat; fourth year, oats seeded down with western rye grass 10 pounds, red clover 3 pounds, alfalfa 3 pounds; fifth year, hay; sixth year, pasture.

Year 3.—Wheat after Summer-fallow.

Number of acres, 2⅕.	
Rent of land at $2 per acre....	$4 40
Harrowing in spring, 1¾ hours, 4-horse team at 48 cents per hour..	84
Seed, 3⅘ bushels at 85 cents per bushel..	3 23
Sowing, 1⅚ hours, 2-horse team at 34 cents per hour..	62
Packing after seeding, ⅚ hours, 2 horse team at 34 cents per hour..	28
Harrowing after seeding, ¾ hours 4-horse team at 48 cents per hour..	36
Cutting, 1⅚ hours, 4-horse team at 48 cents per hour..	88
Twine, at 30 cents per acre..	66
Use of machinery, at 60 cents per acre..	1 32
Stooking, 1 hour manual labour at 19 cents per hour..	19
Threshing, 51⅓ bushels at 7 cents per bushel..	3 60
Yield of grain per acre, 1,408 pounds; yield of straw per acre, 1,335 pounds.	
Total cost of produce (51⅓ bushels grain), (2,938 pounds straw)...	16 38
Cost to produce 1 bushel of grain..	32
" " 1 ton of straw..	11 15

Year 3—Wheat after Wheat.

Number of acres, 2⅕ acres.	
Rent of land at $2 per acre..	$ 4 40
Ploughing in fall, 5¼ hours, 4-horse team at 48 cents per hour..	2 52
Packing after ploughing, ½ hour, 2-horse team at 34 cents per hour..	17
Harrowing after packing, 5/12 hours, 4-horse team at 48 cents per hour..	20
Harrowing in spring, 11/12 hours, 4-horse team at 48 cents per hour..	44
Seed, 3⅘ bushels at 85 cents per bushel..	3 23
Sowing, 2 hours, 2-horse team at 34 cents per hour..	68
Harrowing after grain was up, 5/12 hour, 4-horse team at 48 cents per hour..	20
Cutting, 15/12 hours, 4-horse team at 48 cents per hour..	68
Twine, at 30 cents per acre..	66
Use of machinery, at 60 cents per acre..	1 32
Stooking, 1 hour manual labour, at 19 cents per hour..	19
Threshing, 25 bushels at 7 cents per bushel...	1 75
Yield of grain per acre, 682 pounds; yield of straw per acre, 777 pounds.	
Total cost of produce (25 bushels grain), (1,710 pounds straw)..	16 44
Cost to produce 1 bushel of grain..	66
" " 1 ton of straw..	17 48

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COST OF PRODUCING WHEAT ON ROTATION "P."

Duration of rotation, eight years; first year, summer-fallow; second year, wheat; third year, wheat; fourth year, summer-fallow; fifth year, peas; sixth year, barley seeded down (western rye grass, red clover, and alfalfa); seventh year, hay; eighth year, pasture.

Year 2—Wheat after Summer-fallow.

Number of acres, 1½.	
Rent of land at $2 per acre.. .. .. $	3 00
Harrowing in spring, ⅔ hour, 4-horse team at 48 cents per hour.. ..	32
Seed, 2⅝ bushels at 85 cents per bushel..	2 25
Sowing, 1⅙ hours, 2-horse team at 34 cents per hour...	40
Harrowing after seeding, ⅓ hour, 4-horse team at 48 cents per hour.	16
Cutting, 1¼ hours, 4-horse team at 48 cents per hour..	60
Twine, at 30 cents per acre..	45
Use of machinery, at 60 cents per acre..	90
Stooking, 1 hour manual labour at 19 cents per hour..	19
Threshing, 29 bushels at 7 cents per bushel..	2 03
Yield of grain per acre, 1,166 pounds; yield of straw per acre, 1,940 pounds.	
Total cost of produce (29 bushels grain), (3,800 pounds straw)..	10 30
Cost to produce 1 bushel of grain..	36
" " 1 ton of straw..	7 08

Year 3—Wheat after Wheat.

Number of acres, 1⅜.	
Rent of land at $2 per acre..	2 75
Ploughing in fall, 3¼ hours, 4-horse team at 48 cents per hour.. ..	1 56
Packing after ploughing, ⅚ hour, 2-horse team at 34 cents per hour..	28
Harrowing after packing, 5/12 hour, 4-horse team at 48 cents per hour.	20
Harrowing in the spring, ¾ hour, 4-horse team at 48 cents per hour..	36
Seed, 2 5/12 bushels at 85 cents per bushel..	2 07
Sowing, 1 5/12 hours, 2-horse team at 34 cents per hour..	49
Harrowing after seeding, ⅓ hour, 4-horse team at 48 cents per hour..	16
Cutting, 1 5/12 hours, 4-horse team at 48 cents per hour..	68
Twine, at 30 cents per acre..	41
Use of machinery, at 60 cents per acre..	82
Stooking, 1 hour manual labour at 19 cents per hour..	19
Threshing, 11½ bushels at 7 cents per bushel	80
Yield of grain per acre, 498 pounds; yield of straw per acre, 752 pounds.	
Total cost of produce (11½ bushels grain), (1,035 pounds straw).. ..	10 77
Cost to produce 1 bushel of grain..	94
" " 1 ton of straw..	20 81

COST OF PRODUCING WHEAT ON ROTATION "R."

Duration of rotation, nine years: First year, summer-fallow; second year, peas; third year, wheat; fourth year, oats; fifth year, summer-fallow; sixth year, wheat; seventh year, oats seeded down with western rye grass, red clover, and alfalfa; eighth year, hay; ninth year, pasture.

Year 3—Wheat after Peas.

Number of acres, 2⅓.	
Rent of land at $2 per acre.. .. .. $	4 67
Discing in spring, 3⅙ hours, 4-horse team at 48 cents per hour..	1 52
Harrowing in spring, 1½ hours, 4-horse team at 48 cents per hour.. ..	72
Seed, 4 1/12 bushels at 85 cents per bushel..	3 47
Sowing, 1⅚ hours, 2-horse team at 34 cents per hour..	62
Cutting, 2 hours, 4-horse team at 48 cents per hour..	96
Twine at 30 cents per acre..	70
Use of machinery, 60 cents per acre..	1 40
Stooking, 2 hours manual labour at 19 cents per hour..	38
Threshing, 24⅔ bushels at 7 cents per bushel..	1 72

Yield of grain per acre, 634 pounds; yield of straw per acre, 1,603 pounds.
Total cost of produce (24⅔ bushels grain), (3,740 pounds straw), $16.16.
Cost to produce 1 bushel of grain, 65 cents.
Cost to produce 1 ton of straw, $8.64.

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COST OF PRODUCING WHEAT ON ROTATION "R."—*Concluded.*

Year 6—Wheat after Summer-fallow.

Number of acres, $2\frac{1}{3}$.	
Rent of land at $2 per acre.. .. .. $	4 67
Harrowing in spring, $1\frac{1}{12}$ hours, 4-horse team at 48 cents per hour..	52
Seed, $4\frac{1}{12}$ bushels at 85 cents per bushel..	3 47
Sowing, $1\frac{5}{6}$ hours, 2-horse team at 34 cents per hour..	62
Packing after seeding, 1 hour, 2-horse team at 34 cents per hour.. ..	34
Harrowing after grain was up, $\frac{7}{12}$ hour, 4-horse team at 48 cents per hour..	28
Cutting, $2\frac{1}{4}$ hours, 4-horse team at 48 cents per hour..	1 08
Twine, 30 cents per acre..	70
Use of machinery, 60 cents per acre..	1 40
Stooking, 2 hours manual labour at 19 cents per hour..	38
Threshing, $32\frac{1}{2}$ bushels at 7 cents per bushel..	2 27

Yield of grain per acre, 834 pounds; yield of straw per acre, 1,441 pounds.
Total cost of produce ($32\frac{1}{2}$ bushels grain), (3,362 pounds straw, $15.73.
Cost to produce 1 bushel of grain, 49 cents.
Cost to produce 1 ton of straw, $9.98.

COST OF PRODUCING OATS ON ROTATION "J."

For duration and nature of rotation, see cost of production of wheat in Rotation "J."

Year 4—Oats after Wheat.

Number of acres, 2.	
Rent of land at $2 per acre.. .. .. $	4 00
Ploughing in fall, $4\frac{1}{2}$ hours, 4-horse team at 48 cents per hour..	2 16
Packing after ploughing, $\frac{5}{6}$ hour, 2-horse team at 34 cents per hour..	28
Harrowing after packing, $\frac{1}{2}$ hour, 4-horse team at 48 cents per hour..	24
Harrowing in spring, $\frac{7}{12}$ hour, 4-horse team at 48 cents per hour..	28
Seed, 5 bushels at 50 cents per bushel..	2 50
Sowing, $1\frac{3}{4}$ hours, 2-horse team at 34 cents per hour..	59
Cutting, $1\frac{3}{4}$ hours, 4-horse team at 48 cents per hour..	84
Twine, at 30 cents per acre..	60
Use of machinery, at 60 cents per acre..	1 20
Stooking, $\frac{2}{3}$ hour manual labour at 19 cents per hour..	13
Threshing, 44 bushels at 4 cents per bushel..	76

Yield of grain per acre, 750 pounds; yield of straw per acre, 938 pounds.
Total cost of produce (44 bushels grain), (1,876 pounds straw), $14.58.
Cost to produce 1 bushel of grain, 33 cents.
Cost to produce 1 ton of straw, $15.54.

COST OF PRODUCING OATS ON ROTATION "R."

For duration and nature of rotation, see cost of production of wheat in Rotation "R."

Year 4—Oats on Fall Ploughing.

Number of acres, $2\frac{1}{3}$.	
Rent of land at $2 per acre.. .. .. $	4 67
Ploughing in fall, $4\frac{1}{2}$ hours, 4-horse team at 48 cents per hour..	2 16
Packing after ploughing, $1\frac{1}{4}$ hours, 2-horse team at 34 cents per hour..	42
Harrowing after ploughing, $\frac{1}{2}$ hour, 4-horse team at 48 cents per hour..	24
Discing in spring, 1 hour, 4-horse team at 48 cents per hour..	48
Harrowing in spring, $\frac{7}{12}$ hours, 4-horse team at 48 cents per hour..	27
Seed, $4\frac{2}{3}$ bushels at 50 cents per bushel..	2 33
Sowing, 2 hours, 2-horse team at 34 cents per hour..	68
Packing after seeding, 1 hour, 2-horse team at 34 cents per hour.. ..	34
Cutting, 1 hour, 4-horse team at 48 cents per hour..	48
Twine, at 30 cents per acre..	70
Use of machinery, at 60 cents per acre..	1 40
Stooking, $\frac{5}{6}$ hour manual labour at 19 cents per hour..	16
Threshing, 32 bushels at 4 cents per bushel..	1 28

Yield of grain per acre, 467 pounds; yield of straw per acre, 729 pounds.
Total cost of produce (32 bushels grain), (1,700 pounds straw), $15.61.
Cost to produce 1 bushel of grain, 49 cents.
Cost to produce 1 ton of straw, $18.38.

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COST OF PRODUCING OATS ON ROTATION "R."—*Concluded.*

Year 7—Oats on Fall Ploughing.

Number of acres, 2⅓.	
Rent of land at $2 per acre.. .. ..$	4 67
Ploughing in fall, 6⅓ hours, 4-horse team at 48 cents per hour..	3 04
Packing after ploughing, 1¼ hours, 2-horse team at 34 cents per hour.	40
Harrowing after ploughing, 7/12 hour, 4-horse team at 48 cents per hour.	28
Harrowing in spring, ½ hour, 4-horse team at 48 cents per hour.. ..	24
Seed, 4⅝ bushels at 50 cents per bushel..	2 33
Sowing, 2 hours, 2-horse team at 34 cents per hour..	68
Packing after seeding, ¾ hour, 2-horse team at 34 cents per hour.. ..	24
Cutting, 1¾ hours, 4-horse team at 48 cents per hour..	84
Twine, at 30 cents per acre..	70
Use of machinery, at 60 cents per acre..	1 40
Stooking, 1 hour manual labour at 19 cents per hour..	19
Threshing, 31¾ bushels at 4 cents per bushel..	1 28

Yield of grain per acre 463 pounds; yield of straw per acre, 795 pounds.
Total cost of produce (31¾ bushels grain), (1,855 pounds straw), $16.29.
Cost to produce 1 bushel of grain, 51 cents.
Cost to produce 1 ton of straw, $17.85.

COST OF PRODUCING BARLEY ON ROTATION "P."

For duration and nature of rotation, see cost of production of wheat in Rotation "P."

Year 6—Barley after Peas.

Number of acres, 1½.	
Rent of land at $2 per acre.. .. ..$	3 00
Ploughing in fall, 3½ hours, 4-horse team at 48 cents per hour..	1 68
Packing after ploughing, 1 hour, 2-horse team at 34 cents per hour..	34
Harrowing after ploughing, ½ hour, 4-horse team at 48 cents per hour..	24
Harrowing in the spring, 1 1/12 hours, 4-horse team at 48 cents per hour..	52
Seed, 3 bushels at 50 cents per bushel..	1 50
Sowing, 1 7/12 hours, 2-horse team at 34 cents per hour..	54
Packing after seeding, 7/12 hour, 2-horse team at 34 cents per hour..	20
Cutting, 1 7/12 hours, 4-horse team at 48 cents per hour..	76
Twine, at 30 cents per acre..	45
Use of machinery, at 60 cents per acre..	90
Stooking, 1 hour manual labour at 19 cents per hour..	19
Threshing, 11 bushels at 5 cents per bushel..	55

Yield of grain per acre, 356 pounds; yield of straw per acre, 746 pounds.
Total cost of produce (11 bushels grain), (1,119 pounds straw), $10.87.
Cost to produce 1 bushel of grain, 99 cents.
Cost to produce 1 ton of straw, $19.40.

COST OF PRODUCING PEAS ON ROTATION "P."

For duration and nature of rotation, see cost of production of wheat in Rotation "P."

Year 5—Peas after Summer-fallow.

Number of acres, 1½.	
Rent of land at $2 per acre.. .. ..$	3 00
Discing in spring, 2½ hours, 4-horse team at 48 cents per hour..	1 20
Harrowing in spring, ½ hour, 4-horse team at 48 cents per hour.. ..	24
Share of manure rate of 15 tons per acre, at $1 per ton..	2 45
Seed, 3 bushels at $1.35 per bushel..	4 05
Sowing, 1 5/12 hours, 2-horse team at 34 cents per hour..	49
Packing after seeding, 7/12 hours, 2-horse team at 34 cents per hour..	20
Cutting, 2½ hours, 2-horse team at 34 cents per hour..	85
Use of machinery at 60 cents per acre..	90
Manual labour, 15 hours at 19 cents per hour..	2 85
Threshing, 40 bushels at 7 cents per bushel..	2 80

Yield of grain per acre, 1,593 pounds; yield of straw per acre, 2,627 pounds.
Total cost of produce (40 bushels grain), (3,900 pounds straw), $19.03.
Cost to produce 1 bushel of grain, 47 cents.
Cost to produce 1 ton of straw, $9.61.

COST OF PRODUCING PEAS ON ROTATION "R."

For duration and nature of rotation, see cost of production of wheat in Rotation "R."

Year 3—Peas after Summer-fallow.

Number of acres, 2⅓.	
Rent of land at $2 per acre..	$4 67
Discing in spring, 2 hours, 4-horse team at 48 cents per hour..	96
Share of manure at rate of 7½ tons per acre at $1 per ton..	1 12
Seed, 4⅔ bushels at $1.35 per bushel..	6 30
Sowing, 2 hours, 2-horse team at 34 cents per hour..	68
Cutting, 10 hours, 2-horse team at 34 cents per hour..	3 40
Use of machinery, at 60 cents per acre..	1 40
Manual labour, 30 hours at 19 cents per hour..	5 70
Threshing, 47⅙ bushels at 7 cents per bushel..	3 30
Yield of grain per acre, 1,210 pounds; yield of straw per acre, 2,835 pounds.	
Total cost of produce (47⅙ bushels grain), (6,615 pounds straw) ..	27 53
Cost of produce 1 bushel of grain..	58
" " 1 ton of straw..	8 32

SUMMARY Cost of Production of Field Crops, 1914.

Crop.	Area.	Yield per acre		Cost to produce		
				Per acre	Per ton.	Per bush.
	Acres.	Bush.	Lb.	$ c.	$ c.	cents.
Wheat..	15·94	12	53	7 31	....	73·55
Oats..	6·66	15	26	6 98	....	43·66
Barley..	1·5	7	2	7 24	....	97·00
Peas..	3·83	23	30	11 78	....	51·00
Hay..	6·03	..	..	5 81	8 71	....

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ROTATION OF CROPS.

Some very interesting data have accumulated during the past few years in connection with the crop rotation experiments conducted on the Station. The rotations under way are, for the most part, very simple, and do not, as yet, include hoed crops of any kind. Each rotation has one summer-fallow field to conserve the moisture for succeeding crops, and to aid in the destruction of weeds. Grasses and clovers are used in three rotations, and in addition to the cereal crops commonly grown, peas have been used in two of the rotations. They have proven to be an extremely profitable crop.

PLOT A.—CONTINUOUS WHEAT.

One acre has been devoted to growing a crop of wheat every year. This is called "plot A." During the past season the drought affected this lot more than any other on the Station. The returns from this experiment indicate the necessity of summer-fallowing at frequent intervals, in order to maintain sufficient moisture in the soil for successful crop production.

ROTATION "C" (THREE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

This is the rotation that is commonly practised in the grain-growing sections of the west. With proper management, this arrangement of crops usually produces fairly satisfactory yields, for a number of years, on the new and fertile soils. However, the increasingly rapid spread of weeds will necessitate more frequent soil tillage, and with the increase in the tillage there will be a serious destruction of humus and soil fibre. Eventually, therefore, some system of rotations must be adopted, whereby humus and fibre can be returned to the soil.

ROTATION "J" (SIX YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

Fourth year.—Oats, seeded down with western rye grass, 10 pounds; red clover, 3 pounds; and alfalfa, 3 pounds per acre.

Fifth year.—Hay.

Sixth year.—Pasture.

Rotation "J" has proven, during the past three years, to be one of the most profitable rotations under test, the average profit per acre being $6.12, whereas on the straight grain growing rotation "C" the average profit only amounted to $3.03 per acre.

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Rotation "J" might be described as the first step in the direction of a permanent system of crop rotation. It incorporates the two classes of crop, i.e., grasses and clovers, and cereals that are used in rotations in general farm practice, but does not include a hoed crop of any kind. It provides for one-third of the area to be in grass, one-third to be used for wheat production, one-sixth for the production of seed grain, and one-sixth to be summer-fallowed. The different crops are well balanced, and allow for the sale of some wheat, as well as for feeding a considerable number of live stock. Sufficient grass-roots should be available for furnishing soil fibre, and the two years that the fields are down to grass, should aid materially in the control of weeds.

ROTATION "P" (EIGHT YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Wheat.

Third year.—Wheat.

Fourth year.—Summer-fallow.

Fifth year.—Peas, manure, 15 tons per acre.

Sixth year.—Barley seeded down with rye grass, red clover and alfalfa.

Seventh year.—Hay.

Eighth year.—Pasture.

This rotation is a typical mixed-farming rotation, and is intended for a farm where a considerable number of live stock are fed highly concentrated feeds, as one-quarter of the rotation produces grain for feed purposes. The two summer-fallows, in the eight years, should supply ample moisture for the succeeding crops. The two years that the land is sown to grass should maintain sufficient fibre in the soil, and the application of 15 tons of barnyard manure, once in eight years, should return considerable plant food to the soil, as well as improve its mechanical condition.

ROTATION "R" (NINE YEARS' DURATION).

First year.—Summer-fallow.

Second year.—Peas. Manure 15 tons per acre.

Third year.—Wheat.

Fourth year.—Oats.

Fifth year.—Summer-fallow.

Sixth year.—Wheat.

Seventh year.—Oats, seeded down with rye grass, red clover and alfalfa.

Eighth year.—Hay.

Ninth year.—Pasture.

This is also a mixed-farming rotation, and pre-supposes a considerable number of live stock on the farm. It allows for a reasonable amount of summer-fallow, and a

fairly good acreage sown to grass. However, only two-ninths of the farm will be producing wheat, the crop which is now the main stay of the western farmers. One-third of the farm is used for the production of grain for feeding live stock. It is thus quite apparent that in a system such as this, the profits must be realized, for the most part, from marketing the grain through feeding stock.

ROTATION EXPERIMENTS.

Comparative Costs, Returns, and Net Profits or Losses per acre.

Rotation.	Total cost to operate 1914.	Value of returns 1914.	Net profit 1914.	Net Profit, average 3 year.
	$ c.	$ c.	$ c.	$ c.
Plot "A" (continuous wheat)	7 90	3 70	—4 20	0 81
"C" (three years' duration)	6 53	7 64	1 11	3 03
"J" (six years' duration)	6 03	8 18	2 15	6 12
"P" (eight years' duration)	6 73	8 22	1 49	4 51
"R" (nine years' duration)	6 57	6 76	19	5 53

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Rotation year.	Crops.		Area.	Items of Expense								
				Rent and manure.	Seed, twine and use of machinery.	Manual labour.		Horse Labour (including teamster.) Hours.				
						Hours.	Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	1913.	1914.	Acres	\$ c.	\$ c.	No.	\$ c.	No.	No.	No.	No.	No.
												ROTATION "A"
	Wheat.........	Wheat.........	1	2 00	2 40	1	19	......	$2\frac{1}{3}$	......	$4\frac{2}{3}$	......
	Aggregate		......	2 00	2 40	1	19	......	$2\frac{1}{3}$	......	$4\frac{2}{3}$	......
	Average per acre.....		......	2 00	2 40	1	19	......	$2\frac{1}{3}$	......	$4\frac{2}{3}$	......
												ROTATION "C"
1st...	Wheat.........	Fallow.........	1·5	3 00	0 90	......	......	......	$\frac{3}{4}$	......	7	......
2nd...	Fallow.........	Wheat.........	1·5	3 00	3 60	$\frac{5}{6}$	16	......	$2\frac{1}{3}$	......	$2\frac{1}{2}$	......
3rd...	Wheat.........	Wheat.........	1·5	3 00	3 60	$\frac{5}{6}$	16	......	$2\frac{5}{12}$	......	$5\frac{2}{3}$	......
	Aggregate.....		4·5	9 00	8 10	$1\frac{2}{3}$	32	......	$5\frac{1}{2}$	......	$15\frac{1}{6}$	......
	Average per acre.....		......	2 00	1 80	$\frac{1}{3}$	07	......	$1\frac{2}{9}$	......	$3\frac{1}{3}$	......
												ROTATION "J"
1st...	Pasture.........	Fallow.........	2·20	4 40	1 32	......	......	......	$1\frac{1}{16}$	......	$10\frac{1}{12}$	......
2nd...	Fallow.........	Wheat.........	2·20	4 40	5 28	1	19	......	$2\frac{2}{3}$	......	$4\frac{1}{3}$	......
3rd...	Wheat.........	Wheat.........	2·20	4 40	5 28	1	19	......	$2\frac{1}{2}$	......	$8\frac{5}{12}$	......
4th...	Wheat.........	Oats.........	2·00	4 00	4 18	$\frac{3}{4}$	14	......	$2\frac{7}{12}$	......	$7\frac{1}{3}$	......
5th...	Oats.........	Hay.........	2·20	4 40	4 54	6	1 14	......	$6\frac{2}{3}$	......	......	......
6th...	Hay.........	Pasture.........	2·20	4 40	3 22	......	......	......	......	......	......	......
	Aggregate.....		13·00	26 00	23 82	$8\frac{3}{4}$	1 66	......	$15\frac{7}{12}$	......	$30\frac{1}{6}$	......
	Average per acre.....		......	2 00	1 83	$\frac{7}{20}$	13	......	$1\frac{1}{5}$	......	$2\frac{1}{3}$	......
												ROTATION "R"
1st...	Pasture.........	Fallow.........	2·33	4 67	1 40	......	......	......	$1\frac{5}{12}$	......	$13\frac{1}{6}$	......
2nd...	Fallow.........	Peas.........	2·33	5 79	6 65	30	5 70	......	12	......	2	......
3rd...	Peas.........	Wheat.........	2·33	4 67	5 60	2	38	......	$1\frac{5}{6}$	......	$6\frac{2}{3}$	......
4th...	Wheat.........	Oats.........	2·33	4 67	4 43	$\frac{5}{6}$	16	......	$4\frac{1}{4}$	......	$7\frac{7}{12}$	......
5th...	Oats.........	Fallow.........	2·33	4 67	1 40	......	......	......	$1\frac{1}{6}$	......	$11\frac{1}{2}$	......
6th...	Fallow.........	Wheat.........	2·33	4 67	5 60	2	38	......	$2\frac{5}{6}$	......	$3\frac{11}{12}$	......
7th...	Wheat.........	Oats.........	2·33	4 67	4 43	1	19	......	4	......	$9\frac{1}{6}$	......
8th...	Oats.........	Hay.........	2·33	4 67	4 81	$6\frac{2}{3}$	1 27	......	7	......	......	......
9th...	Hay.........	Pasture.........	2·33	4 67	4 81	......	......	......	......	......	......	......
	Aggregate.....		20·97	43·15	39 13	$42\frac{1}{2}$	8 08	......	$34\frac{1}{2}$	......	54	......
	Average per acre.....		......	2 05	1 86	2	0 38	......	$1\frac{2}{3}$	......	$2\frac{7}{12}$	......
												ROTATION "P"
1st...	Peas and oats..	Fallow.........	1·5	3 00	0 90	......	......	......	$\frac{3}{4}$	......	$6\frac{7}{12}$	......
2nd...	Fallow.........	Wheat.........	1·5	3 00	3 60	1	19	......	$1\frac{1}{6}$	......	$2\frac{1}{4}$	......
3rd...	Wheat.........	Wheat.........	1·31	2 75	3 30	1	19	......	$2\frac{1}{4}$	......	$6\frac{1}{6}$	......
4th...	Wheat.........	Fallow.........	1·5	3 00	0 90	......	......	......	1	......	$7\frac{5}{12}$	......
5th...	Fallow.........	Peas.........	1·5	5 45	4 27	15	2 85	......	$4\frac{1}{2}$	......	3	......
6th...	Peas.........	Barley.........	1·5	3 00	2 85	1	19	......	$3\frac{1}{6}$	......	$6\frac{2}{3}$	......
7th...	Barley.........	Hay.........	1·5	3 00	3 00	$5\frac{1}{2}$	1 04	......	$6\frac{1}{3}$	......	......	......
8th...	Hay.........	Pasture.........	1·5	3 00	2 19	......	......	......	......	......	......	......
	Aggregate.....		11·81	26 20	21 10	$23\frac{1}{2}$	4 46	......	$19\frac{1}{6}$	......	$32\frac{1}{12}$	......
	Average per acre.....		......	2 20	1 79	2	0 37	......	$1\frac{3}{5}$	......	3	......

SCOTT.

(wheat continuously.)

IN RAISING CROP.							PARTICULARS OF CROP.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
3 03	0 28	7 90	7 90				231	1,239			3 70	3 70	—4 20
3 03	0 28	7 90											
3 03	0 28		7 90									3 70	—4 20
(Three year's duration).													
3 61		7 51	5 01										—5 01
1 99	1 68	10 43	6 95	43			1,450	1,906			20 28	13 52	6 57
3 54	1 15	11 45	7 63	68			1,004	1,426			14 11	9 40	1 77
9 14	2 83	29 39									34 39		
2 03	0 63		6 53									7 64	1 11
(Six years' duration).													
5 24		10 96	4 98										—4 98
2 99	3 60	16 46	7 48	32		6	3,098	2,938			42 76	19 43	11 95
4 89	1 75	16 51	7 50	66		6	1,500	1,710			20 85	9 48	1 98
4 34	1 76	14 42	7 21	32		6	1,500	1,876			16 87	8 43	1 22
2 27		12 35	5 61		7·25				3,404		17 02	7 73	2 12
		7 62	3 48								8 80	4 00	0 52
19 73	7 11	78 32									106 30		
1 52	0 55		6 03									8 18	2 15
(Nine years' duration).													
6 80		12 87	5 51										—5 51
5 04	3 29	26 47	11 34	56		3	2,825	6,615			48 98	20 99	9 65
3 82	1 72	16 19	6 94	66		6	1,480	3,740			21 60	9 25	2 31
5 22	1 28	15 76	6 75	49		5	1,088	1,698			12 57	5 39	—1 36
5 92		11 99	5 14										—5 14
2 84	2 27	15 76	6 75	48		6	1,947	3,365			27 64	11 85	5 10
5 76	1 28	16 33	6 99	50		6	1,080	1,855			12 65	5 42	—1 57
2 38		13 13	5 63		11 51				2,280		11 40	4 89	—0 74
		9 48	4 06								7 00	3 00	—1 06
37 78	9 84	137 98									141 84		
1 81	0 47		6 57									6 76	0 19
(Eight years' duration).													
3 41		7 31	4 87										—4 87
1 48	2 04	10 31	6 87	35		6	1,750	2,910			24 78	16 52	9 65
3 82	0 80	10 86	7 90	99		6	685	1,035			9 65	7 01	—0 89
3 90		7 80	5 20										—5 20
2 97	2 80	18 34	12 23	46			2,390	3,941			39 79	26 52	14 29
4 28	0 55	10 87	7 24	97		6	534	1,120			6 46	4 31	—2 93
2 17		9 30	6 20		7·38				2,520		12 60	8 40	2 20
		5 19	3 46								4 50	3 00	—0 46
22 03	6 19	79 98									97 78		
1 85	0 52		6 73									8 22	1 49

SCOTT.

OTHER CROP MANAGEMENT, EXPERIMENTS.

RATES OF SEEDING.

Rates of Seeding Wheat on Summer-fallow.

Variety.	Quantity of seed per acre.	Number of days maturing.	Yield per acre, 1914.		Average yield, 3 years.	
	Bush.		Bush.	Lb.	Bush.	Lb.
Marquis	$\frac{3}{4}$	116	20	00	21	20
"	$1\frac{1}{4}$	116	18	40	22	30
"	$1\frac{3}{4}$	115	18	40	26	30
"	$2\frac{1}{4}$	115	18	00	25	00
"	$2\frac{3}{4}$	115	14	40	22	00
Prelude	$\frac{3}{4}$	108	11	00	....	....
"	$1\frac{1}{4}$	108	10	50	....	....
"	$1\frac{3}{4}$	105	11	20	....	....
"	$2\frac{1}{4}$	104	13	50	....	....
"	$2\frac{3}{4}$	104	10	30	....	....

The land was well summer-fallowed in 1913. The wheat was sown on April 17, 1914.

Rates of Seeding Oats on Summer-fallow.

Variety.	Quantity of seed per acre.	Number of days maturing.	Yield per acre, 1914.		Average yield, 3 years.	
	Bush.		Bush.	Lb.	Bush.	Lb.
Banner	1	99	48	8	94	4
"	$1\frac{1}{2}$	99	52	32	88	27
"	2	99	41	26	86	16
"	$2\frac{1}{2}$	97	57	22	79	00
"	3	92	61	6	79	7
"	$3\frac{1}{2}$	94	61	6	75	27

The oats were sown on May 8, on well worked summer-fallow land.

Rates of Seeding Barley on Summer-fallow.

Plot.	Variety.	Quantity of seed per acre.	Number of days maturing	Yield per acre, 1914.		Average yield 3 years.	
		Bush.		Bush.	Lb.	Bush.	Lb.
1.	Manchurian	1	106	14	8	43	43
2.	"	$1\frac{1}{2}$	104	12	24	41	25
3.	"	2	104	13	16	36	18
4.	"	$2\frac{1}{2}$	104	13	36	35	46
5.	"	3	104	13	16	35	40

The barley was sown on well-worked summer-fallow on May 1, at the above rates of seed per acre.

SCOTT.

DATES OF SEEDING.

Dates of Seeding Marquis Wheat on Summer-fallow.

Dates of Seeding.	Number of days maturing.	Yield per acre, 1914.	
		Bush.	Lb.
April 17	115	18	40
" 24	116	18	20
May 1	118	19	20
" 8	123	21	20
" 15	123	18	00

The Marquis wheat was sown at the rate of 1¾ bushels per acre on well worked summer-fallow.

Dates of Seeding Banner Oats Sown on Summer-fallow.

Dates of Seeding.	Number of days maturing.	Yield per acre, 1914.	
		Bush.	Lb.
April 17	111	67	2
" 24	108	62	12
May 1	102	67	2
" 8	97	60	00
" 15	90	55	10

The Banner oats were sown at the rate of 2¼ bushels per acre on summer-fallowed land.

Dates of Seeding Manchurian Barley on Summer-fallow.

Dates of Seeding.	Number of days. maturing.	Yield per acre, 1914.	
		Bush.	Lb.
April 17	111	15	00
" 24	106	15	20
May 1	99	15	00
" 8	106	13	16
" 15	104	17	4

Manchurian barley was sown at the rate of 2 bushels per acre on summer-fallow land.

SCOTT.

Dates of Seeding Common Flax on Summer-fallow.

Dates of Seeding.	Number of Days maturing.	Yield per acre, 1914.	
		Bush.	Lb.
May 1	125	6	4
" 15	109	6	24
" 29	97	6	24
*June 5	90	3	32

* Badly frosted.

Common flax was sown at the rate of 30 pounds per acre on summer-fallowed land.

SOIL MANAGEMENT EXPERIMENTS.

Seven additional experiments in soil management have been added, during the past season to the list of those already under operation on this Station. The list includes the following:—

(1) Depth of ploughing.
(2) Treatment of summer-fallow.
(3) Treatment of stubble.
(4) Breaking up cultivated grasses and clovers.
(5) Application of barnyard manure, for wheat, oats, barley, and roots.
(6) Ploughing down green manures.
(7) Treatment of seed-bed.

Four experiments have been under way two or more years. They are as follows:—

(1) Breaking prairie sod.
(2) Seeding down to grasses and clovers.
(3) Use of soil packers.
(4) Depths of seeding.

The results of these experiments are appended herewith.

PRAIRIE BREAKING.

An experiment to determine the best method of breaking up the prairie sod has been under way on the Station for the past two years. The following table outlines the methods adopted, and resultant crops:—

BREAKING Prairie Sod.

Plot.	Treatment given, 1913.	Treatment given, 1914.	Yield per acre, 1913.	Yield per acre, 1914.
			Lb.	Lb.
1.	Broken 3½ inches early May. Packed, disced, harrowed. Sown to peas and oats.	Ploughed autumn, 1913. Harrowed, autumn, 1913. Harrowed and packed in spring, 1914.	1,200 (green-feed)	420 (wheat)
2.	Broken 3½ inches early May. Packed, disced, harrowed. Sown to flax.	Ploughed autumn, 1913. Harrowed, autumn, 1913. Harrowed and packed in spring, 1914.	580 (flax)	520 (wheat)
3.	Broken 4½ inches early June. Cultivated thoroughly.	Harrowed and packed in spring, 1914.	....	960 (wheat)
4.	Broken 2½ inches early June. Backset, September. Cultivated from day broken.	Harrowed and packed in spring, 1914.	....	560 (wheat)

SEEDING TO GRASSES AND CLOVERS.

Eleven plots were sown with a mixture of 10 pounds of western rye grass and 10 pounds of red clover in the spring of 1913. The following table outlines the previous treatment given the plots, as well as the method of seeding down, and the resultant crops:—

SEEDING Grasses and Clovers.

Plot.	Treatment, 1912.	Treatment, 1913.	Yield of Hay per acre, 1914.
			Lb.
1.	Summer-fallow	Seeded with wheat	1,360
2.	Summer-fallow	Seeded alone	3,000
3.	Hoed crop	Seeded with wheat	1,800
4.	Hoed crop	Seeded alone	1,600
5.	Wheat	Seeded with wheat on stubble	1,080
6.	Wheat	Seeded alone on stubble	2,520
7.	Wheat	Seeded with oats on stubble	1,440
8.	Wheat	Seeded alone	1,400
9.	Wheat	Seeded with wheat	1,600
10.	Oats	Seeded alone	2,600
11.	Wheat	Seeded with wheat	1,400

PACKING FOR WHEAT SOWN ON SPRING-PLOUGHED STUBBLE LAND.

The plots, on which this part of the experiment was conducted, were in wheat the previous year. They were ploughed 6 inches deep on May 4. The harrowing, packing and sowing were all done on May 5.

Soil Packing for Wheat Sown on Spring-ploughed Stubble Land.

Plot.	Cultural treatment given.	Yield of wheat per acre, 1914.	
		Grain.	Straw.
		Lb.	Lb.
1.	Harrow, subsurface pack, harrow, seed	860	1,380
2.	Harrow, surface pack, harrow, seed	1,100	1,220
3.	Harrow, combination pack, harrow, seed	940	1,060
4.	Harrow, subsurface pack, harrow, seed, subsurface pack	1,260	1,420
5.	Harrow, surface pack, harrow, seed, surface pack	1,300	1,460
6.	Harrow, combination pack, harrow, seed, combination pack	1,340	1,380
7.	Harrow, seed, harrow	880	1,120
8.	Harrow, seed, surface pack	1,080	1,120
9.	Harrow, seed, subsurface pack	920	1,020
10.	Harrow, seed, combination pack	960	1,060
11.	Harrow, seed	980	1,300

PACKING FOR WHEAT SOWN ON FALL-PLOUGHED STUBBLE LAND.

The plots, on which this part of the experiment was conducted, were in wheat the previous year. They were ploughed 6 inches deep on October 8. The fall-packing was done the same day as the ploughing. The spring treatment, including sowing, was given on May 5.

Soil Packing for Wheat on Fall-ploughed Stubble Land.

Plot.	Cultural Treatment given.	Yield of wheat per acre, 1914.	
		Grain.	Straw.
		Lb.	Lb.
12.	Harrow, seed	920	960
13.	Subsurface pack in fall, seed in spring	680	880
14.	Subsurface pack in spring, then seed	680	600
15.	Surface pack in spring, after seeding	560	560
16.	Surface pack in fall. seed in spring	700	860
17.	Surface pack in spring, then seed	760	840
18.	Surface pack in spring, after seeding	700	900
19.	Combination pack in fall, seed in spring	700	980
20.	Combination pack in spring, then seed	840	680
21.	Combination pack in spring, after seeding	660	820
22.	Harrow, seed	720	920
23.	Surface pack in fall, seed, surface pack	840	1,160
24.	Subsurface pack in fall, seed, subsurface pack	580	740
25.	Combination pack in fall, seed, combination pack	720	1,080

Scott.

PACKING FOR WHEAT SOWN ON SUMMER-FALLOW.

The plots for this experiment were all summer-fallowed early in June, 1913. Plots 15 to 20, inclusive, were packed immediately after ploughing. The spring work, including sowing, was done on May 2.

Soil Packing for Wheat on Summer-fallow.

Plot.	Cultural treatment given.		Yield of Wheat per acre, 1914. Grain.	Yield of Wheat per acre, 1914. Straw.
			Lb.	Lb.
1	Harrow, seed	Spring work when seeding.	1,200	1,920
2	Harrow, seed, surface pack		1,400	2,040
3	Harrow, seed, surface pack, harrow		1,200	2,000
4	Harrow, seed, subsurface pack		1,400	2,120
5	Harrow, seed, subsurface pack, harrow		1,320	1,840
6	Harrow, seed, combination pack		1,240	1,880
7	Harrow, seed, combination pack, harrow		1,300	1,860
8	Surface pack, seed, surface pack		1,240	1,760
9	Subsurface pack, seed, subsurface pack		1,620	1,820
10	Combination pack, seed, combination pack		1,360	1,600
11	Surface pack, harrow, seed		1,080	1,320
12	Subsurface pack, harrow, seed		1,160	1,560
13	Combination pack, harrow, seed		1,120	1,640
14	Harrow, seed		1,280	1,560
15	Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed		1,480	1,720
16	Plough for summer-fallow, subsurface pack, cultivate; next spring, smoothing harrow, seed		1,560	1,880
17	Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed		1,500	1,740
18	Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed, surface pack		1,360	2,000
19	Plough for summer-fallow, subsurface pack, cultivate; next spring, smoothing harrow, seed, subsurface pack		1,260	1,340
20	Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed, combination pack		1,520	1,960
21	Harrow, seed	Spring work when seeding.	1,680	2,000
22	Harrow, seed, harrow when 6 inches high		1,440	1,720
23	Harrow, seed, surface pack when 6 inches high		1,140	1,500
24	Harrow, seed, roll when 6 inches high		1,120	1,520
25	Harrow, seed		1,280	1,360

DEPTHS OF SEEDING.

DEPTHS OF SEEDING WHEAT ON SUMMER-FALLOW.

Four plots of wheat were sown on May 2, at the rate of $1\frac{3}{4}$ bushels per acre, at depths ranging from 1 to 4 inches. The average results for the past three years from this experiment are also included in the following table:—

Plot.	Depth of seeding.	Number of days maturing.	Yield per acre, 1914. Grain.	Yield per acre, 1914. Straw.	Average yield per acre, 3 years. Grain.
			Lb.	Lb.	Lb.
1	1 inch deep	117	1,200	1,400	1,780
2	2 inches deep	117	1,280	1,920	1,813
3	3 inches deep	117	1,640	2,440	1,993
4	4 inches deep	117	1,880	2,720	1,993

Scott.

DEPTH OF SEEDING OATS ON FALL-PLOUGHED LAND.

Four plots of oats were sown on May 2, at the rate of 2¼ bushels per acre, at depths ranging from 1 to 4 inches. The following table also includes the average results for the past three years:—

Depths of Seeding Oats.

Plot.	Depth of seeding.	Number of days maturing.	Yield per acre, 1914. grain.	Yield per acre, 1914. straw.	Average yield per acre, 3 years. grain.
			Lb.	Lb.	Lb.
1	1 inch deep	105	680	1,520	1,813
2	2 inches deep	105	700	1,580	2,180
3	3 inches deep	105	600	1,680	2,206
4	4 inches deep	105	520	1,680	2,013

Scott.

EXPERIMENTAL STATION FOR SOUTHERN ALBERTA, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

SEASONAL NOTES.

On account of the excessive drought the season of 1914 has been, with the possible exception of 1910, when the area affected was more restricted, the most trying that has been experienced in southern Alberta since settlement has taken place. In regard to the amount of moisture carried in the soil from 1913 it might be said that the precipitation during the last four months of that year was light, amounting in all to only 2½ inches. During this period, heavy drying winds were prevalent with little or no snow on the ground, so that the soil moisture was severely drawn upon. To counteract this in a measure, however, 3·63 inches of precipitation were received during the first three months of this year, so that the soil was reasonably moist and in excellent condition when work on the land was started.

The first discing, harrowing, or seeding on the Station occurred March 17. The ground froze up toward the latter part of March but opened again shortly, and seeding became general from April 4. Unfortunately, the rainfall during April, May, and until the latter part of June was very much less than usual. For this entire period no soaking rain was experienced, what did come was in the form of light showers that were not sufficient to wet through the dry layer of 2 or 3 inches at the surface and connect with the moisture lower down. The fact that the total precipitation for April was only 0·5 of an inch, and for May 0·3 of an inch, fully illustrates how serious conditions were and how difficult it was to obtain a stand from seeds when sown. A wet spell during the last ten days of June revived things generally, but the dry hot July was too severe a strain on plant life, and the result was that there was a failure of all crops except those sown on summer-fallow. Corn, and late-sown roots which were benefited by the August rains were a possible exception, although they, of course, did much better on summer-fallow. The last frost in the spring occurred on May 12 when a temperature of 29·8 was recorded. The first frost in the fall was on September 15, when the temperature dropped to 31·0°. After passing through such a trying season as this past has been, many settlers, more particularly those who have been located only for the past few years, are anxious to obtain information in regard to the rainfall in the past. Many letters of inquiry in this connection have been received at the Station, and on this account, there is given in the table following the rainfall by months since January, 1902. From February, 1908, the rainfall given is from the records made at the Experimental Station, while the precipitations previous to that date are taken from the records made by Mr. C. B. Bowman, in the city of Lethbridge. A study of the monthly rainfall during the past thirteen years indicates that the precipitation is received in an irregular manner and that there is a great difference between the year that received the lightest rainfall and the year that received the heaviest.

SOME Weather Observations taken at Lethbridge Experimental Station, 1914.

Month.	Temperature F.			Total Precipitation.	Total Sunshine.
	Mean.	Highest.	Lowest.		
	°	°	°	Inches.	Hours.
January	17·05	55·1	−27·0	1·55	104·1
February	11·05	48·1	−40·0	0·96	120·4
March	29·42	64·0	−15·9	1·12	207·4
April	42·4	68·1	16·0	0·54	195·2
May	51·25	79·0	21·2	0·29	318·9
June	58·4	92·0	34·1	2·48	280·5
July	67·5	94·2	40·0	0·93	386·2
August	62·08	97·2	35·4	3·59	295·0
September	52·8	86·0	31·0	1·07	221·4
October	42·88	85·5	20·1	2·17	137·6
November	35·7	66·0	− 8·0	0·63	89·8
December	9·46	42·0	−23·5	1·19	115·0
Total for year				16·52	2,471·5

LETHBRIDGE.

RECORD of Precipitation at Lethbridge from January, 1902-14.

Month.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	1913.	1914.	Average for 13 years.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
January...	0·67	0·62	0·50	1·45	0·22	1·52	0·27	0·49	0·24	0·70	0·80	0·69	1·55	0·75
February..	1·03	0·79	0·90	0·05	0·20	0·30	0·75	0·28	0·83	0·52	0·40	0·30	0·96	0·55
March.....	0·48	0·89	1·03	0·74	0·54	0·34	1·10	0·37	0·17	0·32	0·44	0·42	1·12	0·61
April......	0·15	0·33	0·41	0·56	1·30	1·08	0·67	1·51	0·28	0·82	0·20	0·52	0·54	0·64
May.......	11·27	2·95	2·86	1·13	8·60	1·14	2·78	4·27	0·79	1·90	0·66	1·70	0·29	3·10
June........	5·68	1·12	1·80	2·68	2·31	3·64	7·64	0·62	0·53	4·71	1·73	4·70	2·48	3·05
July........	5·95	1·86	0·96	1·44	0·83	1·43	0·41	1·98	0·09	2·27	2·78	1·29	0·93	1·71
August.....	0·69	3·21	1·19	1·99	4·70	2·30	0·89	0·21	1·07	3·63	1·41	1·93	3·59	2·06
September	0·84	1·60	0·52	0·80	0·16	3·24	0·73	0·49	2·01	4·16	2·61	1·65	1·07	1·53
October...	0·02	0·18	0·85	1·13	1·93	0·05	1·16	0·40	0·59	0·57	1·07	0·50	2·17	0·80
Nov'mber	0·43	0·58	0·03	1·36	0·81	0·14	0·02	0·53	0·41	0·95	0·99	0·36	0·63	0·56
December	0·84	0·70	0·35	0·25	0·88	0·32	0·35	0·54	0·94	0·77	0·23	0·00	1·19	0·57
Total for year.....	28·05	14·83	11·40	13·58	22·48	15·50	16·67	11·65	7·95	21·32	13·21	14·17	16·52	15·93

IMPORTANCE OF SUMMER-FALLOW IN SOUTHERN ALBERTA.

The great variation in the amount of our rainfall from year to year, and the fact that there have been so many seasons when the precipitation, during the months of May, June, and July, has been scant, demonstrate pretty clearly the necessity of giving careful consideration to the summer-fallow. The object of the summer-fallow in southern Alberta, as has often been pointed out, is to conserve moisture. When properly carried out it helps keep weeds under control, and stimulates the growth of crops by making available plant food, but these points are secondary in importance to the fact that it is possible to store a good portion of the moisture that falls during the summer in the subsoil, and have it on hand to supplement the rainfall that comes the following season when the crop is growing. It has been shown that the wheat plant will send fibrous roots down to a depth of $3\frac{1}{2}$ feet for moisture. New comers are sometimes slow in appreciating the importance, in fact the imperative need of the summer-fallow in any rotation of field crops that may be attempted here on non-irrigated land. The discouraging season we have just passed through accomplishes one thing at least, in that it demonstrates in a most striking manner the possibility of getting some crop on well summer-fallowed land in a year so dry that fall- or spring-ploughed stubble land will produce nothing. The key, therefore, to successful dry land farming is the summer-fallow; deep ploughing or the use of the subsurface packer or the disc, etc., are important details but are secondary in importance. The main thing to be borne in mind is that the land must be ploughed before the weeds and grass make any growth, and sufficient cultivation must follow to prevent all growth of vegetation of no matter what character; for the loss of moisture from the soil by evaporation is trivial compared to what is pumped out by plant growth. The cultivation that is necessary to kill the weeds forms a mulch that prevents evaporation very materially. Where the land is thus kept clean of any growth during the whole season, all the rain that arrives is taken up by the soil, and this becomes thoroughly moistened to a depth of from 5 to 7 feet.

TWO FARMS.

Of the 400 acres on the Station, one-half can now be irrigated; the balance is devoted to dry or non-irrigated farming. Two Experimental Farms are really being operated at Lethbridge. Their object is, not to compare the relative merits of the two systems, but to study their individual problems. To aid in doing this, and to prevent confusion, the report is divided into two parts. Part I deals with the results from the non-irrigated or "dry" farm, and part II with the results from the irrigated farm. In this connection, it might be well to point out that the yields of even the same variety of crop grown on the two farms in any one season are not necessarily comparable, and that an increased yield on the irrigated portion may not be entirely due to irrigation, owing to the fact that the preparation of the land in the two fields may not have been identical. Although many of the tests carried out are the same on both the dry and the irrigated farms, still it would be well for the reader, if he wishes to get a comprehensive grasp of the work, to read both parts.

PART I.—THE NON-IRRIGATED OR "DRY FARM."

CROP ROTATIONS (NON-IRRIGATED).

This is the fourth season for the following rotations:—

ROTATION "A."

Wheat continuously.

ROTATION "B" (TWO YEARS' DURATION).

First year.—Wheat.
Second year.—Summer-fallow.

ROTATION "C" (THREE YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat, or coarse grain.

ROTATION "M" (SIX YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Coarse grain. Manured in fall.
Fourth year.—Summer-fallow.
Fifth year.—Peas and oats for hay.
Sixth year.—Barley or oats.

ROTATION "S" (NINE YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Hoed crop.
Third year.—Wheat.
Fourth year.—Summer-fallow.
Fifth year.—Wheat.
Sixth year.—Coarse grain.
Seventh year.—Summer-fallow. Manured.
Eighth year.—Peas and oats for hay. Seeded in fall to rye.
Ninth year.—Rye pasture.

ROTATION "T" (TEN YEARS' DURATION).

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Oats or barley.
Fourth year.—Seeded to alfalfa in rows.
Fifth year.—Alfalfa hay or seed.
Sixth year.—Alfalfa hay or seed.
Seventh year.—Alfalfa hay, seed or pasture.
Eighth year.—Summer-fallow.
Ninth year.—Hoed crop.
Tenth year.—Wheat, manured on stubble.

So that the results from year to year may be easily compared, cost and return values have been fixed, schedule of which is included on page 245 of this report.
The following tables contain details in connection with these rotations:—

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ROTATION "A"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour: Hours.	Manual labour: Cost.	Horse labour (including teamster). Hours: Single horse	2-horse team	3-horse team	4-horse team	5-horse team.
			Acres.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st...	Wheat.......	Wheat..........	1·57	3 14	3 37	0·48	0 09	......	0·81	0 99	5·65	......
	Aggregate..........		......	......	......	......	......	......	......	......	......	......
	Average per acre..........		......	......	......	......	......	......	......	......	......	......

ROTATION "B"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour: Hours.	Manual labour: Cost.	Single horse	2-horse team	3-horse team	4-horse team	5-horse team.
1st...	Fallow.........	Wheat.........	1·57	3 14	3 63	4·99	0·96	......	......	1·25	0·75	......
2nd...	Wheat.........	Fallow.........	1·57	3 14	0 94	0·75	1 41	0·42	1·00	......	9·70	......
	Aggregate..........		3·14	6 28	4 57	5·74	2 37	0·42	1·00	1·25	10·45	......
	Average per acre..........		......	2 00	1 46	1·83	0 35	0·14	0·32	0·40	3·33	......

ROTATION "C"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour: Hours.	Manual labour: Cost.	Single horse	2-horse team	3-horse team	4-horse team	5-horse team.
1st...	Oats..........	Fallow.........	1·57	3 14	1 00	0·75	1 41	0·42	1·00	......	9·60	......
2nd...	Fallow.........	Wheat.........	1·57	3 14	3 56	1·25	0 23	......	......	1·00	0·75	......
3rd...	Wheat.........	Oats..........	1·57	3 14	2 78	0·83	0 15	......	......	1·00	5·65	......
	Aggregate..........		4·71	9 42	7 34	2·83	1 79	0·42	1·00	2·00	16·00	......
	Average per acre..........		......	2 00	1 55	0·60	0 38	0·09	0·21	0·42	3·4	......

ROTATION "M"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour: Hours.	Manual labour: Cost.	Single horse	2-horse team	3-horse team	4-horse team	5-horse team.
1st...	Oats..........	Fallow.........	1·25	5 00	0 75	0·66	0 12	......	......	......	9·12	......
2nd...	Fallow.........	Peas and Oats.	1·25	5 00	2 54	2·41	0 45	0·5	1·41	......	0·92	......
3rd...	Peas and Oats.	Oats..........	1·25	5 00	2 05	0·75	0 14	......	......	0·92	5·01	......
4th...	Oats..........	Fallow.........	1·25	5 00	0 75	......	......	......	......	......	6·17	......
5th...	Fallow.........	Wheat.........	1·25	5 00	3 02	0·75	0 14	......	......	0·92	0·66	......
6th...	Wheat.........	Oats..........	1·25	5 00	2 14	3·25	0 61	0·41	0·5	0·92	4·93	......
	Aggregate..........		7·50	30 00	11 25	7·77	1 47	0·91	1·91	2·76	26·81	......
	Average per acre..........		......	4 00	1 50	1·4	0 19	0·12	0·26	0·37	3·58	......

LETHBRIDGE.

(Wheat continuously).

in raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed Crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
3 41	0 30	10 31	6 57	......	......	......	260	390	......	......	3 65	2 33	−4 24
......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......

(Two years' duration).

0 86	1 77	10 36	6 60	......	......	......	1,515	2,053	......	......	21 22	13 52	6 92
5 01	......	10 50	6 69	......	......	......	......	......	......	......	......	......	−6 69
5 87	1 77	20 86	......	......	......	......	......	......	......	......	21 22	......	......
1 87	0 57	......	6 64	......	......	......	......	......	......	......	......	6 67	0 12

(Three years' duration).

5 07	......	10 62	6 77	......	......	......	......	......	......	......	......	......	−6 77
0 77	1 76	9 46	6 03	0 38	......	5·5	1,510	1,899	......	......	21 08	13 43	7 40
2 32	1 07	9 46	6 03	......	......	......	884	695	......	......	9 52	6 07	0 04
8 16	2 83	29 54	......	......	......	......	......	......	......	......	30 60	......	......
1 73	0 60	......	6 28	......	......	......	......	......	......	......	......	6 50	0 22

(Six years' duration).

4 39	......	10 26	8 21	......	......	......	......	......	......	......	......	......	−8 21
1 04	......	9 04	7 23	......	5 15	2	......	......	3,120	......	15 60	12 48	5 25
2 84	0 40	10 43	8 34	0 95	......	4·5	327	272	......	......	3 54	2 83	−5 51
2 96	......	8 71	6 97	......	......	......	......	......	......	......	......	......	−6 97
0 70	1 14	10 00	8 00	0 57	......	3·5	935	1,465	......	......	13 19	10 55	2 55
3 02	0 70	11 47	9 18	0 62	......	4·5	579	500	......	......	6 30	5 04	−4 14
14 95	2 24	59 91	......	......	......	......	......	......	......	......	38 63	......	......
1 99	30	......	7 99	......	......	......	......	......	......	......	......	5 15	−2 84

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ROTATION "S"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Ac.	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
2nd...	Fallow.........	Corn............	1·25	4 16	3 85	63·66	12 10	5·46	......	......	3·28	......
3rd...	Corn...........	Wheat..........	1·25	4 16	2 96	1·15	0 22	......	1·0	......	0·75	......
4th...	Wheat..........	Fallow.........	1·25	4 16	0 75	......	......	......	......	......	6·10	......
5th...	Fallow.........	Wheat..........	1·25	4 16	3 02	0·84	0 16	......	......	1·0	0·66	......
6th...	Wheat..........	Oats............	1·25	4 16	2 20	0·75	0 14	......	......	0·93	5·57	......
7th...	Oats...........	Fallow.........	1·25	4 16	0 75	......	......	......	......	......	7·72	......
8th...	Fallow.........	Oats and Peas.	1·25	4 16	3 74	2·83	0 54	0·42	2·66	......	1·0	......
9th...	Oats and Peas.	Rye Pasture...	1·25	4 16	2 00	2·00	0 37	0·50	3·08	......	4·57	......
1st...	Rye Pasture...	Fallow.........	1·25	4 16	0 75	1·00	0 19	......	......	......	9·73	......
	Aggregate......................		11·25	37 44	20 02	72·24	13 72	6·38	6·74	1·93	39·38	......
	Average per acre................		......	3 33	1 78	6·40	1 22	0·56	0·60	0·17	3·50	......

ROTATION "T"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
7th...	Alfalfa Seed...	Alfalfa Seed....	1·57	5 02	1 41	2·32	0 44	4·91	1·16	......	0·48	......
8th...	Alfalfa Seed....	Fallow.........	1·57	5 02	0 94	......	......	......	......	......	16·80	......
9th...	Fallow.........	Turnips........	1·57	5 02	1 54	98·00	18 62	7·66	14·13	......	2·32	......
10th..	Turnips........	Wheat..........	1·57	5 02	3 44	0·25	0 05	......	......	1·00	0·75	......
1st....	Wheat..........	Fallow.........	1·57	5 02	0 94	2·32	0 44	......	......	......	10·17	......
2nd...	Fallow.........	W. Wheat......	1·57	5 02	3 77	1·16	0 22	......	......	1·16	0·83	......
3rd...	W. Wheat......	Oats...........	1·57	5 02	2 65	0·66	0 13	......	......	1·00	10·08	......
4th...	Oats...........	Alfalfa Seeding	1·57	5 02	1 41	1·99	0 38	......	......	......	10·30	......
5th...	Alfalfa Seeding	Alfalfa Seed...	1·57	5 02	1 41	2·17	0 41	6·33	1·08	......	0·50	......
6th...	Alfalfa Seed....	Alfalfa Seed....	1·57	5 02	1 41	2·50	0 47	8·09	1·26	......	1·49	......
	Aggregate......................		15·70	50 20	18 92	111·37	21 16	26·99	17·63	3·16	53·72	......
	Average per acre................		......	3 20	1 21	7·09	1 35	1·72	1·12	0·20	3·42	......

(Nine years' duration).

IN RAISING CROP.							PARTICULARS OF CROP.						
							Weight.						
Value of horse labour.	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of Stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
3 05		23 16	18 53		1 50					30,815	46 22	36 98	18 45
0 70	1 93	9 97	7 98	0 36		4	1,665	1,795			23 09	18 47	10 49
2 93		7 84	6 27										−6 27
0 73	1 40	9 47	7 58	0 47		4	1,185	1,845			16 71	13 37	5 79
3 05	0 90	10 45	8 36	0 47		4	757	632			8 20	6 57	−1 80
3 71		8 62	6 90										−6 90
1 50		9 94	7 95		6 55	2½			3,035		15 18	12 14	4 19
3 39		9 92	7 94								2 16	1 73	−6 21
4 66		9 76	7 81										−7 81
23 72	4 23	99 13									111 56		
2 11	0 38		8 82									9 92	1 10

(Ten years' duration).

Value of horse labour.	Cost of threshing.	Total cost.	Cost of 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of Stubble.	Grain.	Straw.	Hay.	Hoed crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
1 96	0 71	9 54	6 08	13 74			41				20 96	13 35	7 27
8 07		14 03	8 94										−8 94
7 99		33 17	21 13	0 08						26,046	39 07	24 89	3 76
0 77	1 10	10 38	6 61	0 62		3·5	100	314			1 49	0 95	−5 66
4 89		11 29	7 19										−7 19
0 88	1 54	11 43	7 28	0 52		5·	1,325	2,055			18 68	11 90	4 62
5 25	0 50	13 55	8 63	1 12		4·5	409	460			4 55	2 90	−5 73
4 95		11 76	7 49										−7 49
2 32	1 34	10 50	6 69	5 02			126				62 80	40 00	33 31
3 34	1 33	11 57	7 37	5 53			126				62 80	40 00	32 63
40 42	6 52	137 22									210 35		
2 57	0 41		8 74									13 39	4 65

In the following table the items of greatest interest in connection with the foregoing rotations are given.

ROTATION EXPERIMENTS.

Cost of Operations, Value of Products and Profits.

Rotations.	Total cost per acre.	Total value per acre.	Net profit per acre, 1914.	Average net profit per acre for 3 years
	$ cts.	$ cts.	$ cts.	$ cts.
"A" (Wheat continuously)	6 57	2 33	−4 24	3 28
"B" Two years' duration	6 64	6 76	0 12	2 27
"C" Three years' duration	6 28	6 50	0 22	4 34
"M" Six years' duration	7 99	5 15	−2 84	2 41
"S" Nine years' duration	8 82	9 92	1 10	2 92
"T" Ten years' duration	8 74	13 39	4 65	12 09

DATES OF SEEDING.

In the following tables the results obtained from wheat, oats, and barley sown at different dates are of some interest. It is planned to continue these tests for a number of seasons.

Dates of seeding Marquis Wheat (non-irrigated) on Summer-fallow.

Date sown.	Date ripe.	Yield per acre.		Average yield per acre for 3 years.	
		Bush.	Lb.	Bush.	Lb.
March 7	July 26	21	30	....	
March 17	July 27	21	00	....	
April 4	July 28	26	30	27	20
April 17	July 29	20	00	25	20
April 30	August 2	20	45	27	55
May 12	August 11	21	15	27	05
May 21	August 22	21	30	28	10
June 1	September 14	Strong winds shattered the grain and the crop was cut for green feed.			
June 23	Cut for green feed				
July 2	Cut for green feed				

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DATES of Seeding Banner Oats (non-irrigated) on Summer-fallow.

Date sown.	Date ripe.	Yield per acre.		Average yield per acre for 3 years.	
		Bush.	Lb.	Bush.	Lb.
March 7	July 29	49	29	.....	.....
March 21	July 28	52	32	.....	.....
April 4	July 27	40	26	64	16
April 20	July 30	58	23	71	1
April 30	July 31	56	1	71	1
May 15	August 12	53	28	76	26
June 1	Cut for green feed, September 17.				
June 15	Cut for green feed, September 26.				
July 2	Cut for green feed, September 26.				

DATES of Seeding Mensury Barley (non-irrigated) on Summer-fallow.

Date sown.	Date ripe.	Yield per acre.		Average yield per acre for 3 years.	
		Bush.	Lb.	Bush.	Lb.
March 7	July 31	19	18	.....	.....
March 21	July 30	20	15	.....	.....
April 4	July 29	20	45	27	14
April 20	July 30	33	36	30	40
April 30	July 31	28	36	33	6
May 15	August 13	27	9	30	34
June 1	September 2	26	42	33	6
June 15	Strong winds shattered the grain and the crop was cut for green feed, September 17.				
July 2	Cut for green feed September 17.				

The larger yields from the later seedings are due to the fact that for the last few seasons the rainfall during May and early June has been particularly light, and the precipitation during the latter part of the growing season has been relatively heavier, thus giving the later sown grain the advantage.

SOIL CULTURAL EXPERIMENTS.

The cultural investigation work, started in 1911, consists of thirteen lines of experiments. Some observations concerning the work and the results obtained are herewith given:—

PRAIRIE BREAKING.

Of the six methods of breaking prairie sod, early June breaking and backsetting in September gives the most favourable results.

DEPTH OF PLOUGHING.

Of a trial of ten different depths of ploughing summer-fallow to be sown to wheat, ranging from 3 inches to 8 inches, and from 5 inches to 8 inches with 4-inch subsoiling,

LETHBRIDGE.

or in other words from 3 to 12 inches, results indicate that about 8 inches was the best suited to the drought conditions of this season. Shallower ploughing gave lighter yields, but deeper ploughing than 8 inches did not increase the yield.

SUMMER-FALLOW TREATMENT.

The results of the three years would seem to favour ploughing 8 inches deep in June, harrowing and cultivating as necessary. Wheat following a crop of rape, sown in rows for pasture on the fallow, gave no crop this dry season, and the average of the two preceding years decreased the yield of wheat as compared to summer-fallow 10½ bushels per acre.

A fallow ploughed June 15 produced an increase of 6½ bushels per acre of wheat more than a fallow ploughed July 15, but otherwise similarly treated.

Once ploughing of the fallow is preferable to twice ploughing. Ploughing 6 inches in June, showed an increase of 3 bushels 50 pounds per acre of wheat over ploughing 6 inches in June and 6 inches in September. Similarly, ploughing 6 inches in June showed an increase of 5 bushels 20 pounds per acre of wheat over ploughing 8 inches in June and 8 inches in September, otherwise same cultivation.

STUBBLE TREATMENT.

The experiment with ten methods of preparing stubble land for wheat and three for oats, showed highest yields when grain was sown on spring ploughed land. The unusually dry season appeared to particularly emphasize this fact.

SEEDING TO GRASSES AND CLOVERS.

This work consists of a test of seeding down with and without a nurse crop on land prepared in different ways. The best results were obtained on summer-fallow. Larger yields resulted when sown without a nurse crop.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS.

Land has been seeded with a uniform mixture of grasses and clovers and broken up in eight different ways. When breaking from grasses and clovers, a season needs to be lost in order to allow the sod to become rotted and to allow the soil and subsoil to collect the moisture for the crop of grain to follow. In the past two seasons, one point has been clearly noticeable, and it is that when the sod is broken and seeded at once to wheat, no crop has resulted.

APPLICATION OF BARNYARD MANURE.

Green manure applied in winter on summer-fallow and disced in before seeding gave 2 tons 1,986 pounds of turnips, over summer-fallow treated in the same way without manure.

When roots were grown on wheat stubble the best results were obtained by applying green manure in winter on the stubble and ploughing under in the spring.

When applying manure for wheat, barley, and oats, green manure applied in winter on summer-fallow and disced in, gave about similar yields to top dressing with rotted manure with spreader, after grain sown on summer-fallow.

No important comparisons can be drawn from the application of manure on wheat, barley, and oats seeded on stuble, as this year's crop was a failure.

LETHBRIDGE.

GREEN MANURING.

This experiment consists of ploughing under peas and tares at different stages of maturity, compared with summer-fallow with and without barnyard manure. Peas ploughed under early in July gave better results than peas ploughed under when in blossom, or tares in late July. Compared with summer-fallow with manure (12 tons per acre) the three-year average succeeding crop of wheat gave an increased yield of 1 bushel 20 pounds per acre over peas ploughed under early in July. The yield of wheat following tares ploughed under in late July fell below summer-fallow without manure.

SEED-BED PREPARATION.

The experiment consists of three methods of seed-bed preparation for wheat on summer-fallow land treated alike. The terms " poor " " good " and " extraordinary " are used to designate the method employed.

The three-year average shows that harrowing the summer-fallow in the spring before seeding gives 8 bushels 20 pounds per acre of wheat more than seeding without any preparation. It is questionable whether the higher yield of wheat by extra work, on the summer-fallow in the spring before or after seeding, compensates for the work involved.

SOIL PACKERS.

The surface, subsurface, and combination packers are used in this experiment.

In ploughing for summer-fallow the three years average increase of ½ bushel of wheat per acre has been noted in favour of the subsurface packer.

Subsurface packing when the grain is 6 inches high gives about the same results as subsurface packing immediately after seeding.

There is very little difference in yield between the surface and combination packers.

DEPTH OF SEEDING.

Wheat and oats are sown from 1 inch to 4 inches deep. Both wheat and oats gave the highest yields when seeded 2 inches deep. In this connection the important point is to be sure that the seed is placed deep enough to be in moist soil.

CORN A SUBSTITUTE FOR SUMMER-FALLOW.

A hoed crop is generally considered to be a very good substitute for summer-fallowing, but one of the most striking lessons learned from this season's work at this Station has been the fact that there appears to be a marked difference from the kind of hoed crop used. In rotation " S " wheat follows corn, in rotation " T " wheat follows turnips, and in several other of the rotations wheat follows summer-fallow. The results, which are somewhat suprising and perhaps difficult to explain, are as follows:—

	1913.		1914.	
	Bush.	Lb.	Bush.	Lb.
Yield of wheat after turnips..	15	55	1	3
Yield of wheat after corn..	33	20	22	12
Yield of wheat after summer-fallow..	26	55	15	14

Both the corn and turnips are planted on summer-fallow and no spring cultivation is given, except a harrowing when necessary just previous to seeding. The yield from the summer-fallow in 1914 is the average yield of five different fields, the highest yield being 16 bushels 22 pounds, and the lowest being 14 bushels 4 pounds. The corn was cut for ensilage, and was weighed green. It yielded at the rate of 11 tons 718 pounds in 1913, and 12 tons 652 pounds in 1914. The reason for the wheat yielding so much better on corn stubble than on turnip land is doubtless due to the fact that corn not only requires less soil moisture, but that growth stops with the first killing frost, which is in early September, while in the case of turnips, perhaps the heaviest drain on the moisture in the soil begins about this time.

LETHBRIDGE.

It is difficult to offer a satisfactory explanation for the increased yield of wheat sown on the corn stubble over that sown on summer-fallow, unless it might possibly be the fact that manure, at the rate of 12 tons per acre, was applied to the land just before it was summer-fallowed for the corn. The same quantity of manure was applied, however, to the rotation in which the turnips are, but not just previous to the turnips. That a dry-land farmer can obtain a goodly supply of rough fodder for his stock by putting in a few acres of summer-fallowed land with Comptons Early or some similar variety of corn, and still have his land in excellent condition for a grain crop the following year is important, but there is another method opened to him. If he could use some extra early variety of corn that would mature the grain he would in one way be still farther ahead, for he could thus add materially to his supply of hog feed in the fall. None of the ordinary varieties can be relied on to do this, but the variety known as Squaw will mature. It has matured here every year since the Station has been established. It does not grow more than about 3 feet high, and the ears grow close to the ground and, although very small are numerous. To make the growing of Squaw corn practicable it would probably be necessary to allow the stock to pasture off the corn in the field during the fall and winter rather than attempt to harvest it.

An experiment was conducted this year to ascertain the feasibility of growing this corn on spring ploughed stubble. Land on which oats were grown in 1913 was ploughed 6 inches deep and immediately harrowed, marked, and planted, the hills being placed 3 feet apart each way. By having it check-rowed in this manner it was possible to cultivate both ways and thus keep the weeds down, with practically no hand work. Although the seed germinated very slowly and some of it was late in coming up, it all matured and yielded 16 bushels and 20 pounds of shelled corn to the acre. When the season, in which no wheat or oats were obtained except on summer-fallow, is considered, the yield of 16 bushels of corn planted on stubble land is certainly encouraging.

A farmer on a half section of land in this district should prepare at least 100 acres of summer-fallow each year. He should be able to get 40 to 60 acres of this ploughed in time to put it in with corn. With the proper machinery he should be able to plant this cheaply and quickly. The necessary work to keep it clean, provided it was planted in check rows, should not be much greater than that required to keep his summer-fallow clean. If, then, he could obtain 16 bushels or better of corn per acre he would be salvaging a pretty valuable crop from his summer-fallow, which would otherwise be yielding him nothing.

In these parts, which until recently have been used for range purposes, where the snowfall is light and does not remain long at a time on account of winds, it would certainly be feasible to pasture off a crop of this kind in the fall or winter by hogs, cattle, or sheep. If our mild dry winters were an asset in the ranching days, why not still make them so?

PART II.—THE IRRIGATED FARM.

The crops on the irrigated part of the Station were satisfactory. In some cases phenomenally large yields were obtained, and in all cases the returns were remunerative.

INSTALLATION OF A PUMP FOR IRRIGATION.

One of the main distributing laterals of the Canadian Pacific irrigation system passes through the Station. There is a certain amount of land lying adjacent to this lateral that is too high to be irrigated by it, though nominally " below the ditch." By using a pump and lifting the water 6 to 7 feet it was possible to irrigate this land. In the spring of 1914 a 9-inch suction and 7-inch discharge rotary pump was installed. This was operated by one 20-horse-power International gasolene farm engine. We thus were able to irrigate about 100 acres more land than was possible by the ordinary gravity method. We collected data regarding the cost of lifting the water, but propose to obtain further data along this line in 1915 before publishing our results.

ROTATIONS ON THE IRRIGATED LAND.

Two rotations " U " and " V " have been established since 1911, and a new one, which is styled " X," was begun in 1914. They are as follows:—

ROTATION " U."

First year.—Seeding alfalfa.
Second year.—Alfalfa hay.
Third year.—Alfalfa hay.
Fourth year.—Alfalfa hay.
Fifth year.—Alfalfa hay.
Sixth year.—Alfalfa hay.
Seventh year.—Hoed crop.
Eighth year.—Wheat.
Ninth year.—Oats.
Tenth year.—Barley.

ROTATION " V."

Alfalfa continuously.

ROTATION " X."

This is a fifteen-year rotation. The land is in alfalfa ten years, then is broken and is in ordinary field crops for five. Instead of breaking up one field of alfalfa each year and seeding down a field each year, as is the case in rotation " U," the breaking is done but once in five years, then the five fields that have been used for ordinary cereal and field crops are all seeded down at once and five fresh fields are broken out and used for these crops. The rotation can be perhaps explained in the following manner:—

First year.—Seeding alfalfa.
Second year.—Alfalfa.
Third year.—Alfalfa.
Fourth year.—Alfalfa.
Fifth year.—Alfalfa.
Sixth year.—Alfalfa.
Seventh year.—Alfalfa.
Eighth year.—Alfalfa.
Ninth year.—Alfalfa.
Tenth year.—Alfalfa.
Eleventh year.—Barley
Twelfth year.—Corn.
Thirteenth year.—Wheat.
Fourteenth year.—Oats.
Fifteenth year.—Peas.

The following tables give details in regard to the results obtained from these rotations. The high yields in certain cases are worthy of note. The relatively low yield of barley in rotation " U " is due to the fact of the rotation being established such a short period of time. Up to the present the fields in which the barley has been sown have never been seeded down to alfalfa. In 1915 the cycle will be complete for the first time, and the barley will be sown on a field that was broken from alfalfa three years previously, and it is expected that the yield will be increased.

ROTATION "U"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Horse labour (including teamster). Hours. Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
			Acres.	$ cts.	$ cts.	No.	$ cts.	No.	No.	No.	No.	No.
1st...	Barley.........	Seeding alfalfa.	1	4 20	2 60	8·33	1 58	......	1·00	......	5·45	......
2nd...	Seeding alfalfa.	Alfalfa hay....	1	4 20	2 60	24·66	4 69	2·25	7·42	......	......	......
3rd...	Alfalfa hay.....	" "	1	4 20	2 60	22·25	4 23	2·75	7·08	......	......	......
4th...	" "	" "	1	4 20	2 60	20·42	3 88	2·75	7·25	......	......	......
5th...	" "	" "	1	4 20	2 60	22·69	4 31	2·85	7·71	......	......	......
6th...	" "	" "	1	4 20	2 60	24·58	4 67	3·17	9·0	......	......	......
7th...	" "	Potatoes.......	1	4 20	16 87	175·25	33 30	9·41	4·5	......	28·50	......
8th...	Potatoes.......	Wheat.........	1	4 20	2 64	9·33	1 77	......	......	1·50	·67	......
9th...	Wheat.........	Oats...........	1	4 20	2 07	7·25	1 38	......	......	·92	4·22	......
10th..	Oats...........	Barley.........	1	4 20	1 94	7·25	1 38	......	......	·83	4·17	......
	Aggregate.....................		10	42 00	39 12	322·01	61 19	23·18	43·96	3·25	43·01	......
	Average per acre..............		......	4 20	3 91	32·2	6 12	2·32	4·39	·33	4·3	......

ROTATION "V"

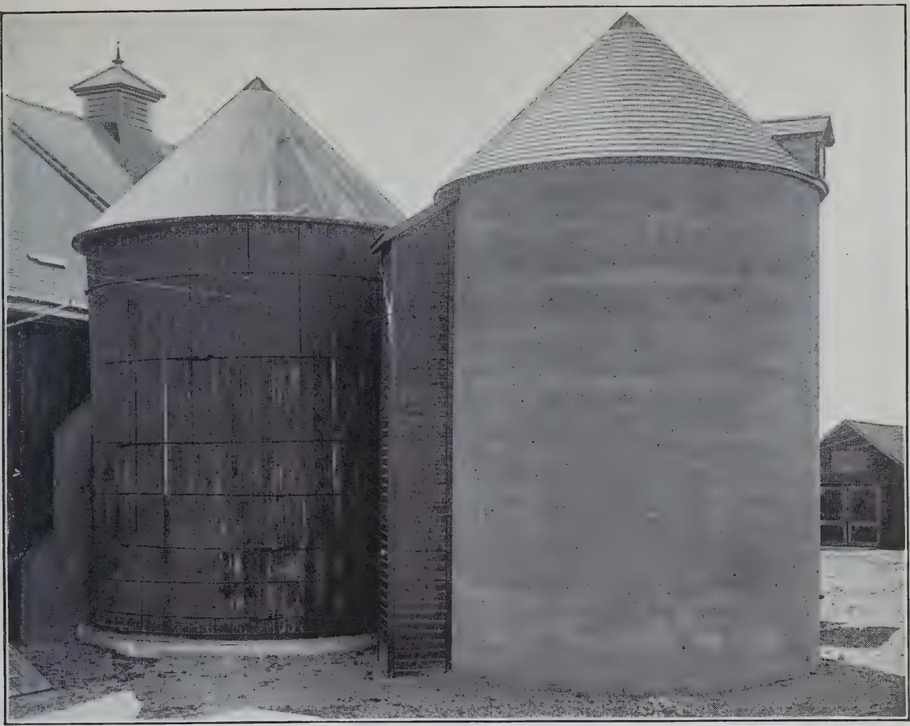
Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
	Alfalfa hay....	Alfalfa hay....	1·06	3 18	63	26·24	4·98	2·83	8·00	......	......	......

ROTATION "X"

Rotation year.	Crops. 1913.	Crops. 1914.	Area.	Rent and manure.	Seed, twine and use of machinery.	Manual labour. Hours.	Manual labour. Cost.	Single horse.	2-horse team.	3-horse team.	4-horse team.	5-horse team.
1st...	Breaking.......	Barley.........	1	3 80	1 87	1·0	19	......	......	·82	·80	......
2nd...	"	Corn...........	1	3 80	3 70	4·75	9 03	4·25	......	......	2·5	......
3rd...	"	Wheat.........	1	3 80	2 34	·83	16	......	......	·83	·58	......
4th...	"	Oats...........	1	3 80	1 87	·83	16	......	......	·83	·58	......
5th...	"	Peas...........	1	3 80	2 70	1·0	19	1·6	......	·25	·58	......
6th...	....	Seeding alfalfa.	1	3 80	7 80	2·0	38	......	1·6	......	·90	......
7th...	....	" "	1	3 80	7 80	2·0	38	......	1·6	......	·90	......
8th...	....	" "	1	3 80	7 80	2·0	38	......	1·6	......	·90	......
9th...	....	" "	1	3 80	7 80	2·0	38	......	1·6	......	·90	......
10th..	....	" "	1	3 80	7 80	2·0	38	......	1·6	......	·90	......
11th..	....	Grain hay......	1	3 80	1 60	5·0	95	·75	4·9	......	......	......
12th..	....	" "	1	3 80	1 60	5·0	95	·75	4·9	......	......	......
13th..	....	" "	1	3 80	1 60	5·0	95	·75	4·9	......	......	......
14th..	....	" "	1	3 80	1 60	5·0	95	·75	4·9	......	......	......
15th..	....	" "	1	3 80	1 60	5·0	95	·75	4·9	......	......	......
	Aggregate.....................		15	57 00	59 48	43·41	16 38	9·60	32·75	2·48	9·54	......
	Average per acre..............		......	3 80	3 97	2·89	1 09	·6	2·18	·17	·67	......

Lethbridge. Corn grown on rotation 'S' yielding 12 tons green feed per acre on dry land in 1914.

Cutting Corn, Experimental Station, Lacombe, Alta.



Brandon : Above-ground portion of new solid concrete silo, and also of old wooden stave silo.

Agassiz, B.C. Manure Spreader. An implement that has paid for itself in less than three years.

Agassiz, B.C. Green fir Stumps, 4 to 6 feet in diameter. These stumps cost $8 to $14 to destroy.

Agassiz, B.C. A good Blast. Stump left in best position for easy handling.

Agassiz, B.C. A poor Blast. Not enough powder. One-half of the stump still quite solid. Very expensive to finish getting it out.

Agassiz, B.C A poor Blast. Too much powder used. Two large pieces blown clear out one large piece blown 42 ft. from hole.

(ten years' duration).

In raising Crop.							Particulars of Crop.						
							Weight.						
Value of Horse labour.	Cost of threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of stubble.	Grain.	Straw.	Hay.	Hoed Crop.	Total value.	Value of crop per acre.	Profit or loss per acre.
$ cts.	$ cts.	$ cts.	$ cts.	cts.	$ cts.	Ins.	Lb.	Lb.	Lb.	Lb.	$ cts.	$ cts.	$ cts.
2 96		11 34	11 34										11 34
3 13		14 62	14 62		2 81	3			10,390		62 34	62 34	47 72
3 15		14 18	14 18		2 91	3			9,960		58 56	58 56	44 38
3 21		13 89	13 89		3 27	3			8,505		51 03	51 03	37 14
3 39		14 50	14 50		3 12	3			9,300		55 80	55 80	41 30
3 92		15 39	15 39		3 06	3			10,050		60 30	60 30	44 91
17 75		72 12	72 12	12	4 00					35,875	295 95	295 95	223 83
94	4 48	14 03	14 03	22		10	3,815	5,500			53 60	53 60	39 57
2 40	4 28	14 33	14 33	13·4		9	3,633	2,630			38 98	38 98	24 65
2 34	2 30	12 16	12 16	26		7	2,210	1,370			23 47	23 47	11 31
43 19	11 06	196 56									700 03		
4 32	1·20		19 66									70 01	50 35

(Alfalfa continuously).

3 49		12 28	11 59		2 24				10 980		65 88	62 15	50 56

(Fifteen years' duration).

72	1 55	8 13	8 13	23			1,490	1,210			16 11	16 11	7 98
2 35		18 88	18 88							22,783	34 17	34 17	15 29
62	1 26	8 18	8 18				1,100	1,060			15 19	15 19	7 01
62	1 72	8 17	8 17				1,460	1,160			15 76	15 76	7 59
71	75	8 15	8 15	73			645	2,035			14 94	14 94	6 79
98		12 96	12 96										-12 96
98		12 96	12 96										-12 96
98		12 96	12 96										-12 96
98		12 96	12 96										-12 96
98		12 96	12 96										-12 96
1 87		8 22	8 22						4,000		20 00	20 00	11 78
1 87		8 22	8 22						4,000		20 00	20 00	11 78
1 87		8 22	8 22						4,000		20 00	20 00	11 78
1 87		8 22	8 22						4,000		20 00	20 00	11 78
1 87		8 22	8 22						4,000		20 00	20 00	11 78
19 27	5 28	157 41									196 17		
1 28	35		10 49									13 07	2 58

In the following table the items of greatest interest in connection with the foregoing rotations are given.

ROTATION EXPERIMENTS.—Cost of operations, Value of Products and Profits.

Rotation.	Total cost per acre.	Total value per acre.	Net profit per acre 1914.	Average net profit per acre for 3 years.
	$ cts.	$ cts.	$ cts.	$ cts.
"T" (Ten years' duration)	19 66	70 00	50 34	53 25
"Y" Alfalfa hay continuously	11 59	62 15	50 56	49 61
"X" Fifteen years' duration	10 05	13 07	3 03	....

LETHBRIDGE.

EXPERIMENTAL STATION FOR CENTRAL ALBERTA, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

WEATHER DURING GROWING SEASON, 1914.

The precipitation during the season of 1914 was normal, and the temperature during the growing season very slightly higher than the average. The seeding of grain began on April 15, and from that date until the close of the seeding season, conditions were favourable for the progress of spring's work and for the germination of seed and growth of plants. The first frost in the fall occurred on the 1st of September, and at this date most grain crops were so far matured as to be out of danger and already much of the earlier grain was in the shock.

Some Weather Observations taken at Experimental Station, Lacombe, 1914.

Month.	Temperature F.			Total Precipitation.	Sunshine.	Month.	Temperature F.			Total Precipitation.	Sunshine.
	Highest	Lowest.	Mean.				Highest	Lowest.	Mean.		
	°	°	°	Inches.	Hours.					Inches.	Hours.
January	53·6	—36·1	9·3	1·45	73·5	July	87·6	39·3	62·25	1·11	316·8
February	48·6	—41·6	8·9	1·0	120·1	August	85·8	32·2	58·1	1·10	265·3
March	64·0	—23·6	26·65	·8	153·8	September	80·3	23·4	51·12	2·36	172·9
April	72·6	14·7	40·1	·34	174·2	October	77·0	19·9	47·1	·30	120·6
May	77·3	24·3	47·89	1·285	291·9	November	58·8	—18·1	40·39	1·5	84·8
June	84·8	36·1	55·81	6·07	218·7	December	48·8	—19·1	11·3	·98	66·1
Total for year										18·295	2058·7

ROTATIONS.

The tabular results of the rotations "C," "L," "K," and "O," are submitted herewith.

Attention is called to the results with rotation "L." These have been so satisfactory that a modified form of this rotation is being used on the large fields as the general rotation on the Farm. Instead of the fourth year being wheat we are substituting oats for this year on the main Farm. The profits per acre every year, with the exception of the years in pasture, are quite satisfactory. For the entire six years of the rotation the average net profit per acre is $7.60. This return is net after paying land rental, covering cost of farmyard manure, machine depreciation, etc., and would represent 7 per cent on a land capitalization of over $100 per acre.

While the amount of pasture produced in these rotations is not sufficient to cover the charges made against the land on the basis of $1 per month per head of stock carrying, yet we believe that the seeding of cultivated grasses for pasture pays, particularly on land carrying a fairly high valuation. The stock-carrying capacity of land under cultivated grasses is about double that of similar soil remaining in its natural state and producing the native grasses. The figures taken as a basis for the cost data submitted in the rotation tables may not meet with the approval of all western farmers. Objection has been made to charging $1 per ton for farmyard manure applied to the land. We believe results fully justify the value placed on such manure, and that the application of farmyard manure to even naturally fertile soil pays large dividends. Seven cents per hour for each horse is charged for horse labour, and manual labour is charged at the current wage. Sixty cents per acre per annum is charged to cover depreciation of machinery necessary to the production of the crop and, if reasonable care be taken of the machinery when not in use and the machine covers a fair acreage annually, the charge is sufficient. Whether objections be taken to the basis on which these figures are compiled or not, the importance of each farmer having some basis from which he may determine each year the cost of producing a bushel of grain or a ton of hay is apparent. Such cost data reveal the point at which loss is taking place, and make possible a curtailment of such losses and a consequent enlargment of profits.

ROTATION "C"

Rotation Year.	Crops. 1913.	Crops. 1914.	Area.	Items of Expense: Rent and Manure.	Seed, Twine and use of Machinery.	Manual Labour. Hours.	Manual Labour. Cost.	Horse Labour (including teamster). Hours. Single Horse.	2-horse team.	3-horse Team.	4-horse Team.	5-horse Team.
			Acres	$ c.	$ c.	No.	$ c.	No.	No.	No.	No.	No.
1st....	Fallow.........	Wheat.........	1	2 00	2 60	2	0 38	......	13½	¾	6	......
2nd...	Wheat.........	Wheat.........	1	2 00	2 60	1	0 19	......	1¾	¾	6	......
3rd...	Wheat.........	Fallow.........	1	2 00	0 60	......	......	......	10¾	......	¼	......
	Aggregate.........................		3	6 00	5 80	3	0.57	......	25¾	1½	12¼	......
	Average per acre.................			2 00	1 93	1	0 19	......	8·5	·5	4·1	......

ROTATION "K"

Rotation Year.	1913.	1914.	Area.	Rent and Manure.	Seed, Twine and use of Machinery.	Manual Labour Hours.	Manual Labour Cost.	Single Horse.	2-horse team.	3-horse Team.	4-horse Team.	5-horse Team.
1st...	....	Hoed crop....	3·56	14 24	10 34	92¼	17 53	17¾	70½	46½	14¼	......
2nd...	Hoed crop.....	Wheat..........	3·50	14 00	8 67	6	1 14	......	1¼	2	13¼	......
3rd...	Wheat.........	Barley.........	3·41	13 64	6 56	11¼	2 13	......	7¼	2¾	14¾	2
4th...	Barley.........	Hay...........	3·53	14 12	7 17	10½	1 99	¾	17¼	......	......	......
5th...	Hay...........	Pasture........	3·63	14 52	5 56	......	......	......	......	......	......	......
6th...	Pasture........	Pasture........	3·60	14 40	5 41	......	......	......	......	......	......	......
	Aggregate.........................		21·23	84 92	43 71	120	22 79	18½	96¼	51¼	42¼	2
	Average.........................		......	4 00	2 06	5·65	1 07	·87	4·53	2·41	1·99	·10

ROTATION "L"

Rotation Year.	1913.	1914.	Area.	Rent and Manure.	Seed, Twine and use of Machinery.	Manual Labour Hours.	Manual Labour Cost.	Single Horse.	2-horse team.	3-horse Team.	4-horse Team.	5-horse Team.
1st...	Barley.........	Hay...........	1·74	6 96	2 65	5	95	......	8	......	......	......
2nd...	Hay...........	Pasture........	1·74	6 96	2 65	4	76	......	2	....	......	......
3rd...	Pasture........	Pasture........	1 74	6 96	2 65	......	......	......	......	......	......	......
4th...	Pasture........	Wheat.........	1 74	6 96	4 20	1·45	33	......	19¼	......	......	......
5th...	Wheat.........	Oats...........	1·74	6 96	3 22	2·40	51	......	4¼	......	4	......
6th...	....	Barley.........	1·74	6 96	3 22	3	57	......	4½	......	4	......
	Aggregate.........................		10·44	41 76	18·59	15·85	312	......	38	......	8	......
	Average per acre.................		......	4 00	1 78	1·52	0 30	......	3·64	......	·76	......

ROTATION "O"

Rotation Year.	1913.	1914.	Area.	Rent and Manure.	Seed, Twine and use of Machinery.	Manual Labour Hours.	Manual Labour Cost.	Single Horse.	2-horse team.	3-horse Team.	4-horse Team.	5-horse Team.
1st....	....	Potatoes.......	2·42	6 92	38 45	218·5	41 51	11	64¼	......	1	......
2nd...	....	Wheat.........	2·42	6 92	6 07	1	19	......	3¾	2¼	1⅛	......
3rd...	....	Oats...........	2 42	6 92	4 42	6·2	1 17	......	4¼	3¼	15⅔	......
4th...	....	Fallow.........	2 42	6 92	1 45	3	0 57	......	11⅔	......	19½	......
5th...	....	Barley.........	2 42	6 92	4 75	3	0 95	......	3½	3⅓	22	......
6th...	....	Hay...........	2·42	6 92	5 78	......	......	......	......	......	......	......
7th...	....	Pasture........	2·42	6 92	5 78	......	......	......	......	......	......	......
	Aggregate.........................		16·94	48 44	66 70	231·7	44 39	11·00	87·41	9·16	59·33	......
	Average per acre.................			2 86	3 93	13·68	2 62	·65	5·16	·54	3·50	......

LACOMBE.

in Raising Crop.							Particulars of Crop.						
							Weight.						
Value of horse labour.	Cost of Threshing.	Total cost.	Cost for 1 acre.	Cost for 1 bushel.	Cost for 1 ton.	Height of Stubble.	Grain.	Straw.	Hay.	Hoed Crop.	Total Value.	Value of crop per acre.	Profit or loss per acre.
$ c.	$ c.	$ c.	$ c.	cts.	$ c.	Ins.	Lb.	Lb.	Lb.	Lb.	$ c.	$ c.	$ c.
(Three years' duration).													
7 78	2 36	15 12	15 12	45	......	......	2,030	5,810	....	....	29 97	29 97	14 85
3 69	1 98	10 47	10 47	37	......	......	1,700	3,450	....	....	24 39	24 39	13 92
3 77	......	6 37	6 3.	......	......	......	....	....	....	....	......	......	—6 37
15 24	4 34	31 96	......	......	......	......	....	....	....	....	54 36	......	....
5 08	1 45	......	10 66	......	......	......	....	....	....	....	......	18 12	7 46
(Six years' duration).													
54 65	......	96 76	27 18	......	......	......	38,596	....	....	60,277	148 21	41 13	13 95
7 60	9 95	41 36	11 82	90	......	......	8,530	17,055	....	....	122 25	34 92	23 10
11 89	4 85	39 07	11 45	40	......	......	4,642	7,450	....	....	53 87	15 80	4 35
5 01	......	28 29	8 01	......	......	......	....	....	16,035	....	80 17	22 71	14 70
......	......	20 08	5 53	......	......	......	....	....	....	....	8 50	2 34	—3 29
......	......	19 81	5 50	......	......	......	....	....	....	....	1 87	0 52	—4 98
79 15	14 80	245 37	......	......	......	......	....	....	....	....	414 87	......	....
3 73	0 69	......	11 55	......	......	......	....	....	....	....	....	19 54	7 99
(Six years' duration).													
2 72	......	13 28	7 63	......	......	......	....	....	4,659	....	23 29	13 38	5 75
0 68	......	11 05	6 35	......	......	......	....	....	2,095	....	11 14	6 40	0 05
......	......	9 61	5 52	......	......	......	....	....	....	....	1 71	0 98	—4 54
6 54	4 06	22 09	12 69	......	......	6	3,480	6,125	....	....	49 46	28 36	15 67
3 37	3 75	17 81	10 23	......	......	6	3,220	4,820	....	....	37 02	21 27	11 04
3 45	2 04	16 24	9 33	......	......	6	1,964	3,148	....	....	22 78	13 09	3 76
16 76	9 85	90 08	......	......	......	......	....	....	....	....	145 40	......	....
1 60	94	......	8 62	......	......	......	....	....	....	....	......	13 91	5 29
(Seven years' duration).													
25 29	......	112 18	46 35	......	......	......	....	....	....	30,363	253 00	104 54	58 19
2 76	6 50	22 43	9 26	......	......	......	5,570	10,690	....	....	79 61	32 90	23 70
10 30	7 53	30 34	12 53	......	......	......	6,400	9,280	....	....	73 28	30 28	17 75
13 33	......	22 27	9 20	......	......	......	....	....	....	....	......	......	—9 20
13 12	4 56	30 29	12 52	......	......	......	4,380	10,164	....	....	53 96	22 30	9 78
......	......	12 70	5 25	......	......	......	....	....	....	....	2 50	1 03	—4 22
......	......	12 70	5 25	......	......	......	....	....	....	....	2 50	1 03	—4 22
64 80	18 59	242 91	......	......	......	......	....	....	....	....	464 85	......	....
3 82	1 09	......	14 33	......	......	......	....	....	....	....	......	27 44	13 11

Lacombe.

FIELD PEAS.

An acre of "Arthur" peas was sown on land cleared and broken out of heavy brush in 1913. From this area 30 bushels of peas were threshed, and a part of the crop secured will be used for mixing with oats in 1915 for the production of green feed, while a slightly larger area of peas will be sown alone to maintain a supply of seed to be used annually for the production of peas and oat fodder. This variety of pea should prove satisfactory for the purpose, for while the amount of straw produced is less than is common to such varieties as Prussian Blue, the advantage of "Arthur" over such long-strawed varieties consists in the fact that it will ripen its seed, while varieties such as Prussian Blue have seldom done so here. A small field of peas sown alone each year will maintain a constant supply of seed for the green-feed area, and at a comparatively low cost per bushel, thus obviating the necessity of buying seed peas at high prices each year for this purpose.

GREEN FEED.

By seeding 1 bushel of peas and 2 bushels of oats to the acre a very satisfactory fodder has been obtained. Weighed green, a heavier tonnage was secured than was expected, and the quality when cured in the shock or put into the silo has been remarkably high. One and one-half acres of green feed produced 19 tons, green weight, when put over the scales prior to being put into the silo. We believe that where peas are used with the oats for green feed, or even if oats are sown alone that satisfactory ensilage may be made. Figures showing the relative nutritive value for cattle of oat ensilage, to green feed cured in the shock, and other bulky fodders may be seen in the report of the Animal Husbandry Division of this Station this year.

ERADICATION OF WEEDS.

Ample opportunity has been afforded on this Farm for testing different methods for the eradication of weeds. The orginal quarter-section purchased in 1907, and the major portion of the land bought in 1912 was polluted with weeds of various kinds, including ball mustard, wild buckwheat, wild oats, couch grass, and a small quantity of stinkweed.

The number of weeds in the crop is less year by year, and the methods responsible for their eradication are practical and simple. When the grain is cut, a disc, set to run rather shallow, follows immediately behind the binder as often as time and horse-power will permit. Fall ploughing to a depth of 6 inches is practised, and the land is packed with a surface or combination packer the day the ploughing is done. As a rule, there is sufficient moisture to start a crop of weeds, particularly when the ploughing and packing is done early. In the spring, as soon as the land is ready to work the drag harrow is put over all fall-ploughed land, which assists in warming the soil, providing a mulch, and also encourages the germination of weeds. These operations stimulate the growth of three or four crops of weed seeds and, in time, greatly reduce the number of weeds in the growing crop without the loss of a year for summer-fallow. Our chief objection to summer-fallow in this class of land is that the crop following summer-fallow is usually so heavy that it lodges and the grain does not fill properly. The crop, being lodged, is difficult to harvest and, consequently,the profits from land growing crops on summer-fallow are not as great as are realized from land not devoted to summer-fallow. The quality of the grain is also better on non-summer-fallowed soil. The six-year rotation to which reference has already been made calls for the application of 12 tons of barnyard manure to the acre during the fall and winter following hay crop.

The manure thus applied is distributed over the hay stubble, and many weed seeds germinate during the rainy season in the small particles of manure; later these plants are destroyed because of lack of moisture, but the vitality of such weed seed is lost and, when the manure is incorporated with the soil later, many seeds are harmless which were vital when the manure was applied.

SOIL CULTURAL EXPERIMENTS.

SUMMER-FALLOW TREATMENT.

The conclusions previously drawn are again borne out by the results for the season of 1914. It is an advantage to plough but once for summer-fallow. The ploughing should be done to a depth of about 6 inches.

DEPTH OF PLOUGHING.

Deep ploughing in stubble and sod taken over an average of the years, gives highest yields.

STUBBLE TREATMENT.

Fall ploughing 6 inches deep has given increased yields of from 2 to 10 bushels to the acre as compared with discing the stubble in the fall; and also superior results to either burning the stubble in the fall or spring, or to spring ploughing.

OTHER TRIALS.

Before publishing results of the other cultural tests under way, another year's work at least will be necessary to justify conclusions and warrant publication.

FENCING AND BREAKING.

Over 2 miles of woven-wire fence was erected. This fence runs nine wires high with ten perpendicular wires to the rod, and all No. 9 gauge. A block of about 10 to 15 acres of land was cleared on the new Farm, and is ready for the breaking plough in the spring of 1915. A few acres were broken out during the season; these were small strips of land where fences formerly stood and the fact that they can now be cultivated in the usual way will facilitate this work by increasing the length of the furrows in this field.

LACOMBE.

EXPERIMENTAL STATION, INVERMERE, B. C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

WEATHER CONDITIONS.

The spring of 1914 opened unfavourably with uniformly low temperatures throughout April and May, and a great deal of cold wind, which checked plant growth. Frost was registered on sixteen nights during the month of April. The minimum mean temperature for the month was only 23° above freezing point; and July was the only month of the year without frost. The rainfall during the growing months was rather above the average, but the character of soil and subsoil is such that a much greater amount of precipitation might have been experienced with gain to the field crops. August was dry, and this necessitated much late irrigation. On the whole, the results on the irrigated land were satisfactory, while those on the non-irrigated plots were poor.

The frost was out of the ground by the end of March, and the plots were laid out early in April, but this being the first year for this work much levelling was necessary to facilitate irrigation, and some of the crops therefore were sown rather late.

Some Weather Observations taken at the Invermere Experimental Station, 1914.

Month.	Temperature F.			Precipitation.			Heaviest in 24 hrs.	Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.		
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January	46	—11	22·49	·66	10·05	1·71	0·48	54·5
February	46	—27	21·66	....	5·00	0·50	0·25	73·6
March	53	— 5	31·23	0·07	3·25	0·39	0·27	144·8
April	71	22	43·84	1·25	....	1·25	0·59	165·1
May	87	28	51·98	1·46	....	1·46	0·70	237·1
June	85	34	56·91	1·59	....	1·59	0·76	198·4
July	95	42	64·48	1·57	....	1·57	0·69	314·5
August	95	33	60·72	0·75	....	0·75	0·27	267·9
September	80	33	49·78	2·16	....	2·16	0·64	148·3
October	66	24	41·77	0·77	....	0·77	0·24	86·7
November	51	3	30·68	0·39	4·00	0·79	0·40	56·4
December	35	—16	11·70	4·25	....	0·42	0·27	86·8
Total for year	....	....	....	14·92	22·3	13·36	....	1,834·1

ROTATION OF CROPS.

Four rotations varying in duration and treatment were started last year. They are as follows:—

ROTATION "A" (FOUR YEARS' DURATION).

First year.—Roots.
Second year.—Wheat.
Third year.—Peas.
Fourth year.—Oats.

Plots of one-half an acre each are used for this rotation. The plots are to be irrigated as required, and fluming has been installed in order that an exact record may be kept of the amount of water used. The pea crop will be ploughed under in order to supply the much-needed humus to the soil. The subjoined tables give a summary of the observations made in this and the following rotations.

ROTATION "B" (FIVE YEARS' DURATION)—A MIXED FARMING ROTATION.

First year.—Wheat.
Second year.—Roots.
Third year.—Oats, seeded down.
Fourth year.—Clover.
Fifth year.—Clover.

The plots for this rotation are of one-half an acre. Irrigation will be used as required, but no exact record will be made of the amount of water used. It is a mixed farming rotation, supplying hay, roots, and grain, and will probably be a suitable one for this district.

ROTATION "C" (TWO YEARS' DURATION).

First year.—Oats.
Second year.—Summer-fallow.

Plots of one-quarter acre are used for this rotation, which is intended to demonstrate the evils of a system of cultivation which has been practised considerably in this district.

It may reduce the necessity of irrigation, but the system has no doubt impoverished the land, encouraged many weeds difficult to eradicate, and depleted the soil of humus.

ROTATION "D" (TEN YEARS' DURATION)—A DRY FARMING ROTATION.

First year.—Summer-fallow.
Second year.—Alfalfa.
Third year.—Alfalfa.
Fourth year.—Alfalfa.
Fifth year.—Alfalfa.
Sixth year.—Summer-fallow.
Seventh year.—Hoed crop.
Eighth year.—Grain.
Ninth year.—Summer-fallow.
Tenth year.—Grain.

The plots in this rotation are also one-quarter acre each. There will be no irrigation. The alfalfa will be sown in drills 28 inches apart, which will take 4 pounds of seed to the acre. One application of farm manure will be given in the eighth year after the grain has been harvested.

The alfalfa sown the last day of June made a good start. The returns in roots and grain in this the first season, were poor, but one has to take into consideration the fact that no special preparation for dry farming had been made.

INVERMERE.

ROTATION "A"

First year.......................Roots.
Second year.....................Wheat.

*Plot.	Acreage	Crop.	Date sown.	Quantity of seed per acre.	Variety.	Manuring. Date.	Manuring. Kind.	Manuring. Quantity per acre.
	Acre.							
1	½	Roots	May 19		16 rows turnips	May 9	Farm Manure	
					11 rows mangels	July 7	Nitrate of Soda	100 lb.
					4 rows sugar beets			
2	½	Oats	May 21	2½ bush.	Abundance			
3	½	Peas	May 22	1¾ bush.	Golden Vine			
		Rape	May 28	4 lb.		July 28	Superphosphate.	200 lb.
4	½	Oats	May 20	2½ bush.	Abundance			

ROTATION

1	½	Roots	May 20		16 rows turnips	May 16	Farm manure	
					11 rows mangels	July 7	Nitrate of soda.	100 lb.
					4 rows sugar beet			
2	½	Oats	May 21	2½ bush.	Abundance			
3	½	Rape	July 18	4 lb.		July 22	Superphosphate.	200 lb.
4	½	Oats	May 21	2½ bush.	Abundance			
		Clover	May 21	11 lb.				
5	½	Clover	June 23	11 lb.				

ROTATION

1	½	Oats	May 20	2½ bush.	Abundance			
2	½	Summer-fallow						

ROTATION

1	¼	Alfalfa	June 30	4 lb.	Grimm's			
2	¼	Alfalfa	June 30	4 lb.	Grimm's			
3	¼	Alfalfa	June 30	4 lb.	Grimm's			
4	¼	Summer-fallow						
5	¼	"						
6	¼	Swedes	June 1		N. Western			
7	¼	Wheat	May 21	1½ bush.	Marquis			
8	¼	Summer-fallow						
9	¼	Wheat	May 21	1½ bush.	Marquis			
10	¼	Barley	May 22	1½ bush.	Mensury			

*See separate table.

(Four years' duration).

Third year........................Wheat.
Fourth year........................Oats.

Cultivating.		Dates of			Yield per acre.
Date.	Operation.	Irrigating.	Cutting.	Harvesting.	
July 2	Singling to 10 inches *		October 8	October 12	18 tons, 1,398 lb.
July 7	Horse hoeing				8 tons, 1,790 lb.
October 16	Ploughing				8 tons, 1,402 lb.
October 20	Ploughing		August 22	August 27	28·29 bushels.
July 27	Ploughed in				
October 13	Ploughing				
November 4	Ploughing		August 25	August 27	33·64 bushels.
"B"					
July 8	Singling to 10 inches		October 13	October 15	17 tons, 1,631 lb.
July 13	Horse hoeing				8 tons, 1,514 lb.
October 18	Ploughing				7 tons, 404 lb.
			August 25	August 27	25·47 bushels.
October 14	Ploughing				
			August 25	August 27	35·05 bushels.
"C"					
October 21	Ploughing		August 21	August 27	34·64 bushels.
"D"					
November 7	Ploughing		October 22	October 24	
August 29	Ploughing		August 19	August 20	8·6 bushels.
August 21	Ploughing		August 19	August 20	9·1 bushels.
August 19	Ploughing		August 14	August 18	12·5 bushels.

INVERMERE.

Table showing irrigation of Rotation "A" during season 1914.

Plot.	Irrigating. Commenced.	Irrigating. Ended.	Hours.	Inches on weir.	Discharged cubic feet per second.	Acre inches.	Waste in acre inches.	Net flow in acre inches.	Acre inches per acre.
1	June 24, 9 a.m.	June 24, 5 p.m.	8	3¾	0·1389	1·111	none.	1·111	2·22
	August 1, 8 a.m.	August 1, 5 p.m.	9	4¼	0·1899	1·709	0·070	1·639	3·28
(Roots)	August 24, 7 a.m.	August 24, 6 p.m.	11	4¼	0·1899	2·089	0·310	1·779	3·56
	August 25, 7 a.m.	August 25, 6 p.m.	11	4¼	0·1899	2·089	0·231	1·858	3·72
		Totals........	....	....	....	6·998	0·611	6·387	12·78
2	July 6, 8 a.m.	July 6, 5 p.m.	9	3¾	0·1389	1·250	none.	1·250	2·50
(Oats)	July 7, 8 a.m.	July 7, 5 p.m.	9	4¼	0·1899	1·709	0·015	1·694	3·39
		Totals	....	....	....	2·959	0·015	2·944	5·89
3	July 8, 8 a.m.	July 8, 5 p.m.	9	4¼	0·1899	1·709	none.	1·709	3·42
	July 9, 7 a.m.	July 9, 1 p.m.	6	4½	0·2191	1·315	0·116	1·199	2·40
(Peas)	August 20, 2 p.m.	August 20, 6 p.m.	4	3½	0·1169	0·467	none.	0·467	0·93
	August 21, 7 a.m.	August 21, 6 p.m.	11	3½	0·1169	1·286	0·042	1·244	2·49
	August 22, 7 a.m.	August 22, 5 p.m.	10	3¾	0·1389	1·389	0·310	1·079	2·16
		Totals........	....	....	....	6·166	0·468	5·698	11·40
4	July 9, 1 p.m.	July 9, 5 p.m.	4	4½	0·2191	0·876	none.	0·876	1·75
(Oats)	July 10, 7 a.m.	July 10, 6 p.m.	11	4¾	0·2508	2·759	0·140	2·619	5·24
	July 11, 7 a.m.	July 11, 12 n.	5	4¾	0·2508	1·254	0·116	1·138	2·28
		Totals......	....	....	....	4·889	0·256	4·633	9·27

Total water used in four plots, 19·662 acre-inches, *i.e.*, 9·831 inches per acre.

The soil is a light sandy loam, deficient in humus, about 12 inches deep, with moraine subsoil.

INVERMERE.

EXPERIMENTAL FARM, AGASSIZ, B. C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

WEATHER CONDITIONS.

The weather during the past calendar year has been the best in many years for promoting good field work. July, August and December, were three almost rainless months. During the remaining nine months, over 60 inches of precipitation were recorded, which was ample for all crop growth.

Some Weather Observations taken at Agassiz Experimental Farm, 1914.

Month.	Temperatures.					Total Precipitation.	Total Sunshine.
	Maximum.		Minimum.		Mean.		
	Date.		Date.		Degrees.		
		°		°	°	Inches.	Hours.
January	4, 6, 11	49	28	12	38	13·96	12·6
February	26	60	6	12	39·56	4·06	66·9
March	19	73	26	22	45·02	3·12	98·5
April	21	72	1	31	51·55	2·94	143·9
May	22	85	4	36	56·28	3·55	202·8
June	15	87	4	39	52·91	5·18	176·3
July	17	87	6	40	62·07	0·15	246·9
August	19	87	3	44	62·995	0·60	224·5
September	23	78	25, 27, 30	40	52·33	6·29	60·5
October	15	71	4	34	50·4	7·53	111·5
November	10, 28	52	16	28	42·6	14·72	36·3
December	2, 8	49	21	16	35·235	0·53	80·3
Total						62·63	1,460·2

FIELD CROPS.

Following out the four-year rotation, which was started in the spring of 1911, we have this year covered the last remaining section of the Farm with a hoed crop.

This year there were grown for stock feed the following crops:—

	Tons.	Lb.
Corn silage	211	710
Clover silage	124	....
Mangels	84	1,450
Turnips	6	155
Carrots	3	1,520
Sugar beets	....	1,820
Potatoes	9	1,200
Mixed grain	15	753
Barley	1	356
Oats	1	782
Peas	....	1,200
Clover hay	82	800

This gave a total of 437 tons 1,041 pounds silage and root crops; 82 tons 800 pounds of hay crop; and 18 tons 1,091 pounds grain. There was a sufficient quantity of roughage to carry all our stock over the winter and allow enough silage for summer feeding this coming season.

The corn crop consisted of two varieties, viz: Longfellow and Comptons Early, the seed being procured from growers in Ontario. Both varieties were very poor. The germination was very weak, and consequently the stand was much inferior to that of other years. This condition affected our total yield greatly.

The mangel crop consisted of one-half each of Danish Sludstrup and Perfection Long Red. Both varieties gave good yields in field conditions. A trial was made with large quantities of commercial fertilizer per acre on three one-quarter acre plots. All the plots had a dressing of 20 tons of barnyard manure, and the following results will give some idea of the quality of the land under hoed crop:—

Plot No.	Treatment.	Yield per acre. 1914. Tons.	Yield per acre. 1914. Lb.	Average for 3 years. Tons.	Average for 3 years. Lb.
	Per acre.	Tons.	Lb.	Tons.	Lb.
1	No commercial fertilizer	4	60	12	102
2	160 pounds nitrate of soda 160 pounds, muriate of potash. 400 pounds superphosphate.	25	87	26	1,589
3	160 pounds nitrate of soda 400 pounds superphosphate.	22	32	25	333

This season there were prepared 205 plots for permanent cultural and fertilizer experiments. One hundred and forty of these will be devoted to a four-year rotation in an endeavour to ascertain:—

(1) The best methods for preparing land for hoed crops (corn and roots).
(2) The best seasons for applying manures.
(3) Methods of applying chemical fertilizers to mangels.
(4) The best after-harvest cultivation of root land in preparation for a grain crop, to be seeded with clover.

Sixty-five plots are devoted to fertilizer work, both barnyard and chemical, the object being to ascertain the rate of application for most economical gains.

A description of the field is here given. Ranges one and two are being used for fertilizer work, and the four remaining ones are for cultural experiments. This field has been under preparation since 1911. In 1911 it was ploughed from sod and planted to corn; in 1912 it was sown to grain and seeded to clover. In 1913 two crops of clover were harvested and the third ploughed under. In 1914 it was laid off in plots and sown to oats as a control crop. Careful notes were kept on the condition of this crop with a view to detecting any natural variations in the plots.

DRAINING.

During the season, 3,800 feet of the main ditch at the back of the Farm were cleaned out and put in good shape. The brush and grass was cleared away to a distance of 10 feet on either side, and the sides were cleared and sloped. From 6 inches to 2 feet of earth were cleaned from the bottom.

AGASSIZ.

FENCING.

The amount of new fencing erected this year was not very great, but a great deal of work was performed repairing some of the original fences.

The new fence erected amounts to 1,900 feet. Part of this, 1,200 feet, was put along a lane where there are some other styles, so as to make a comparison between them.

The posts in over 9,000 feet of fencing received a coat of white paint, which added greatly to their appearance.

LAND CLEARING.

During the year, some 14 acres of land have been cleared and prepared for crop. This work was done through the different seasons of the year. Mr. A. McKay, farm foreman, is responsible for all the clearing operations, and has supplied the figures and information which we have to give. The work was done by him in a thorough, painstaking manner, and the long experience which he has had in land clearing in this section makes this work the more valuable to those intending to clear similar land.

The major portion of the land cleared was covered with a heavy growth of Douglas fir, birch, maple, alder, vine maple, and a thick undergrowth of hazel and salmon berry. In all of this there was a large amount of old, semi-decayed fallen timber. On the average, this dead timber amounted to ten trees per acre. In an ordinary season this dead material is more difficult to handle than the green wood, since, in most cases, it is too rotten to blast, and it is so wet, as a rule, that it must be chopped up with mattocks, piled by hand and mixed with green wood before it will burn at all.

Of the green material, there were 10·9 fir stumps of from 4 to 6 feet in diameter per acre. The smaller hardwood ranged from 8 to 15 inches in diameter, and the average acre contained 315 stumps. Besides this, there were clumps of hazel and vine maple so large that it was found cheaper to blast them than to try to pull them with horses. This made at least 425·9 stumps or stump equivalents of all sizes to be blasted per acre on the roughest 7 acres. The remaining 7 acres contained many dead stumps and much fallen timber and were not so difficult to clear.

The surface of the land was very rough. It was piled up in hummocks as a result of the falling of large trees in past years. These had carried up large quantities of earth with their roots.

METHOD OF CLEARING.

The first operation was to clean up all the undergrowth; then all the standing timber, excepting the large firs, was cut and put into windrows. At this stage, if it was so desired, any material required for fuel could be taken out. The trees being in full leaf and the season favourable for drying, these windrows were fired about ten days after cutting, resulting in an excellent burn. Following this burning, all the old logs that would split were blasted and fired. Then all the very rotten logs and the remaining portions of green material were piled and completely burned. The three principal reasons for burning and piling at this stage are:—

(1) To have a reasonable quantity of fuel to consume the wet, rotten logs.

(2) To confine the fire to restricted areas, and thus save humus.

(3) To prevent all this small and rotten material from being buried by the soil, which is naturally thrown up by the blasting of the stumps.

All the small stumps were blasted next, then as the big stumps were thrown up, all the small ones could be pulled and piled into the holes. By this means the fire was confined to subsoil burning, and the fir stumps, having so much pitch in them it was possible to readily burn all material that could be hauled and piled in these holes.

AGASSIZ.

The following equipment was used:—

One ⅝-inch wire cable, 175 feet long. This was cut in five pieces, two of 50 feet, three of 25 feet. These pieces were fitted with hooks and rings, to run through the blocks.

Three iron snatch-blocks, with 8-inch shieve.

Two ⅞-inch wire chocker cables, 10 feet long, fitted with loop at one end and flat hook at the other.

One steel bar, 6 feet long by 1 inch, flattened at one end for cutting roots, and having a small scoop at the other end.

One long-handled shovel, cut and curved to fit an 8-inch hole under the stumps.

Two augers, one 6 feet long by 2 inches, to bore under small stumps. One 4 feet by 1¼ inches for splitting logs.

Small tools, such as axes, mattocks, shovels, saws, chain, etc.

COST OF CLEARING.

The average cost per acre for the 14 acres, for clearing ready to plough, was $145.39. The cost for breaking, which was an exceptionally good job, was $10.84 per acre. Picking up roots and small sticks, etc., after breaking, cost $1.57 per acre. Harrowing, discing, levelling, and sowing cost $6.42 per acre. This is the average of 7 acres only, but it is for the roughest part. At the time of writing, the remaining 7 acres are not sown.

The land received five harrowings, four discings, and was then rolled and seeded. These figures are based on the current rate of wages here:—

Labour, 20 cents per hour.
Teamster, 24·5 cents per hour.
Horse labour, 25 cents per hour per team.
Depreciation on equipment, 15 per cent.

The expense items per acre are classified as follows:—

Manual labour	$ 105 78
Horse labour	12 50
Powder, caps and fuse	26 08
Interest on equipment	1 03
Total	$ 145 39

The main object this year was to get a good piece of land cleared and to get some figures on the method used, for a basis on which other methods could be compared. This being the case, not many experiments were made excepting in the detail work. On this we give a few notes.

The difference between handling small, green stumps (15 inches in diameter) after blasting, by direct draught, or with cable and blocks was noted. For this work, twenty stumps of comparable size were chosen. Of these, ten were blasted so as to allow them to be hauled out with a team by the aid of cable and blocks. The other ten had to be blasted more heavily in order that they might be hauled out with a team by direct draught. The comparison is as follows:—

TWENTY Stumps blasted and pulled.

—	Ten by cable and blocks.		Ten by direct draught.	
Powder	7·5 pounds at 10·5 cents	$0·78	11 pounds at 10·5 cents	$ 1·15
Caps	10 at 0·65 cents	0·065	10 at 0·65 cents	0·065
Fuse	18 feet at 0·55 cents	0·099	18 feet at 0·55 cents	0·099
Manual labour	7·5 hours at 20 cents	1·50	10 hours at 20 cents	2·00
Teamster labour	2·3 hours at 24·5 cents	0·56	5·5 hours at 24·5 cents	1·34
Horse labour	2·3 hours at 25 cents	0·575	5·5 hours at 25 cents	1·37
Total cost		$ 3·579		$ 6·024
Average cost per stump		·35		0·60

As will be seen, the light blasting and pulling by a cable and blocks is the most economical. Even if one allowed 100 per cent depreciation on the outfit, there would still be room for argument in favour of that method, if one had 5 acres to clear.

A spot was chosen where some trees had been cut several years ago; the stumps had not been allowed to "sucker," and were commencing to decay. Ten of these were taken out, and, even as compared to the light blasting and pulling, were found much less expensive. The cost per stump of equal size was 17 cents for the dead ones as compared to 35 cents, or 17 cents to 60 cents for green stumps. The chief difference in cost lay in the quantity of powder required, and the amount of team and manual labour.

A comparison was made between the cost of felling big trees by burning and by sawing. These trees averaged 135 feet high and 4 feet 6 inches on top of the stump. To burn down each tree took 2 pounds powder, 2 caps, 4 feet fuse, and one-half hour of labour, making a total cost of 34·5 cents. It took the trees from three to five hours to burn down. To fell a tree the same size by sawing took two men 4 hours, which cost $1.60. The expense in burning trees down is a great deal less, but there is a certain element of chance connected with it. After the charge is exploded a fire is started in the wound and is then left to burn at will. If this fire happens to strike down it may burn the stump off close to the ground, in which case the stump is more costly to get out than if the tree had been felled by the saw. When the heart is once burned out of a stump it is hard to handle.

A few figures are here given to show the cost of handling a big tree after it is down. The best method used was splitting and burning. An inch and a quarter auger hole is bored into the heart of the tree about 12 feet from the butt. A small charge of powder is put in and the tree split. A fire is started in the small crack and another charge is put in further up the tree, the distance depending upon the length of the first crack. This is continued until the tree is split throughout its entire length. The fire does not need any attention until the tree is nearly consumed; at this stage all the branches can be piled, along with the unburned portions, and all destroyed at once. If one has sufficient experience, all the holes can be made and filled and all the shots put off at one time. This is a saving of time, if other men are working in the field.

An average tree will take 5 pounds powder, 20 feet fuse, 10 caps; also four hours' labour blasting, and five hours' labour cutting branches and burning same, the total cost being $2.50 per tree of about 7·5 cords, exclusive of limbs.

To destroy the stump of a tree, such as the one just described, cost as follows: 27·5 pounds powder, 10 feet fuse, 2 caps, 12 hours' teamster labour, 12 hours team labour, and 12 hours manual labour, making a total cost of $11.28. This cost will vary from $8 to $14 per stump, depending upon the success of the blast. The work just described represents the most difficult stumps that one would have to blow out and destroy.

Stumps of trees which had been cut about ten years, and that were sound, but dry, cost much less. The average cost of stumps of this kind is as follows: Powder 24 pounds, 4 caps, 8 feet fuse, labour 11 hours, teamster 1 hour, team 1 hour, making a total cost of $5.28. This class of stump averaged 5 feet in diameter 4 feet above the ground.

In destroying a large stump the cost depends upon its condition after the blast. Properly blasted, the stump should be split into five or six sections, and these sections should stand up around the hole. If any of the sections are blown clear out of the hole and any distance away, the cost of handling this portion is almost as much as that of destroying the remainder of the stump.

The stumps cost less for powder when the ground is full of moisture, as it is in the winter, but the small material and all rotten or fallen timber is much more cheaply destroyed during the dry weather in summer.

Agassiz.

EXPERIMENTAL STATION, SIDNEY, B.C.

REPORT OF THE FOREMAN MANAGER, S. SPENCER.

WEATHER CONDITIONS AND CROP NOTES.

The spring season commenced early in April, with fine weather and light showers of rain. Fall wheat and rye sown in November, 1913, made 12 inches growth during the month. Timothy, rye grass, and clover were also showing good growth. However, owing to the cold nights in June and the very dry weather of May, June and July, the yields were small but the crops were good in quality and free from disease. This will provide seed for next season.

Some Weather Observations taken at Sydney Experimental Station, 1914.

1914.	Highest.	Lowest.	Mean.	Precipitation.	Total Sunshine.
	°	°	°	Inches.	Hours.
January	52·2	28	30·10	8·47	35·1
February	51	24	42·97	3·21	140·5
March	67	29	44·26	1·26	126·5
April	68	34	50·38	1·63	172
May	82	40	56·00	0·28	293
June	83	38·5	58·50	2·14	281
July	85·5	44	64·23	0·13	342
August	83·5	46	62·36	0·14	300·2
September	72	41·5	54·07	1·97	87·4
October	66	39	51·90	3·63	94·4
November	56	32	46·30	8·20	46·3
December	41·6	34	37·80	1·21	72·56
Total				32·27	1,990·96

CROP YIELDS.

Crop.	Variety.	Area.	Yield per acre.	Total yield.
		Acres.	Bushels.	Bushels.
Wheat	Marquis	7·7	27	207·9
Oats	Victory	14·5	38	551
Oats	Banner	1	66	66

ROTATION OF CROPS.

Next season rotation "C" (four years' duration) will be commenced on approximately 35½ acres. Drainage operations will also be started on this area and continued until the 35½ acres are drained.

DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

REPORT

FROM THE

DIVISION OF ANIMAL HUSBANDRY

ON

BEEF CATTLE, DAIRY CATTLE AND DAIRYING, HORSES, SHEEP AND SWINE

FOR THE FISCAL YEAR ENDING MARCH 31, 1915.

PREPARED BY

The Dominion Animal Husbandman, Central Farm, Ont.	E. S. Archibald, B.A., B.S.A.
Superintendent—	
Experimental Station, Charlottetown, P.E.I. - - - -	J. A. Clark, B.S.A.
Experimental Farm, Nappan, N.S. - - - - - - - -	W. W. Baird, B.S.A.
Experimental Station, Kentville, N.S. - - - - - -	W. S. Blair.
Experimental Station, Fredericton, N.B. - - - - -	W. W. Hubbard.
Experimental Station, Ste. Anne de la Pocatière, P.Q.	J. Bégin.
Experimental Station, Cap Rouge, P.Q. - - - - -	Gus. A. Langelier.
Experimental Station, Lennoxville, P.Q. - - - - -	J. A. McClary.
Experimental Farm, Brandon, Man. - - - - - -	W. C. McKillican, B.S.A.
Assistant to the Superintendent—	
Experimental Farm, Indian Head, Sask. - - - - -	K. MacBean, B.S.A.
Acting Superintendent—	
Experimental Station, Scott, Sask. - - - - - - - -	M. J. Tinline, B.S.A.
Superintendent—	
Experimental Station, Lethbridge, Alta. - - - - -	W. H. Fairfield, M.S.
Experimental Station, Lacombe, Alta. - - - - - -	G. H. Hutton, B.S.A.
Experimental Farm, Agassiz, B.C. - - - - - - - -	P. H. Moore, B.S.A.

REPORT

FROM THE

DIVISION OF ANIMAL HUSBANDRY

OTTAWA, March 31, 1915.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports upon the beef cattle, dairy cattle and dairying operations, horses, sheep, and swine on the Central Experimental Farm and branch Farms and Stations for the past year.

The main cattle barn, calf barn, and bull barn, which were destroyed by fire on October 11, 1913, were during the past fiscal year reconstructed, under the direction of yourself. The plans were prepared by this Division, and the actual construction carried on under our immediate supervision. The completion of these buildings has permitted of the inception of much experimental work. Some of the more important features of the new barns are described in the body of this report, and many phases of the work being conducted in these buildings are also discussed therein.

During the past fiscal year another assistant was appointed for this Division. Mr. G. W. Muir was named for the position of Second Assistant to the Dominion Animal Husbandman.

For help in preparing and compiling a large portion of the data contained in the text of the Central Experimental Farm report, I am indebted to Mr. G. B. Rothwell, First Assistant, and also to Mr. G. W. Muir, Second Assistant. The conducting of work and reporting results of such work on the branch Farms and Stations have been in the hands of the Superintendents of those Farms and Stations.

I regret to state that, owing to the pressure of work along other lines, Mr. D. D. Gray, farm foreman, who for some years has so efficiently conducted the various operations with swine, has found it necessary to sever his connection with this Division in this regard. During the past fiscal year this work has been taken over by the First Assistant, Mr. G. B. Rothwell. To both of these men, and also to the swine herdsman, Mr. Fred Reade, special credit is due for the very efficient manner in which the various operations were conducted, and careful and accurate records kept.

The work of keeping breeding and sales records for the Central Experimental Farm, and also the registration work for all Dominion Experimental Farms, has been most efficiently performed by Mr. G. B. Rothwell.

Mr. Jos. Meilleur, dairyman at the Central Farm, has done most excellent work and kept careful records in his department.

To Mr. Robt. Cunningham, herdsman at the Central Farm, I am indebted for constant and efficient care of stock and for interest and assistance in new work, as well as the satisfactory performance of the routine work in connection with all classes of cattle.

Mr. O. Johnson has shown both efficiency and diligence in his office work, which includes a heavy correspondence and the keeping of records.

During the past year another permanent appointment has been made to the staff of this Division, Mr. R. R. McKibbin being appointed to the position of stenographer. His work has been most satisfactory.

Attention is drawn to the fact that all feeding experimental work is conducted in co-operation with the Division of Chemistry. Readers are referred to the report of the Dominion Chemist, Dr. Frank T. Shutt, in which are contained the analyses of all foodstuffs being fed experimentally.

During the year I have attended many meetings, including the series of meetings on "Patriotism and Production." I have judged at various exhibitions and have studied live-stock conditions in various districts in the several provinces, in addition to my regular duties on the Central Experimental Farm. I have also visited each of the branch Farms and Stations where live stock work is being conducted, both in the eastern and western provinces, and, in co-operation with the superintendents of these Farms and Stations, under the direction of yourself, have started many new lines of live stock experimental work.

I have the honour to be, sir,
Your obedient servant,

E. S. ARCHIBALD,
Dominion Animal Husbandman.

OTTAWA.

BEEF CATTLE.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN, E. S. ARCHIBALD, B.A., B.S.A.

As reported previously, no breeding herds of beef cattle have been maintained on the Central Experimental Farm since the removal, in 1911, of the Shorthorn herd from Ottawa to the branch Farm at Brandon, Man., this owing to lack of pasturage, forage crops, and buildings necessary for such work.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

BEEF CATTLE.

The very high prices paid for all grades of fat cattle for the Newfoundland market during the summer of 1914 left very few desirable feeders in the country in the autumn.

An average bunch of steers was purchased on October 15, and allowed to run on rape and pasturage for one month. When the rape was pastured off close, they were given ensilage corn in the field. On November 5, when all danger from flies was over, the steers were dehorned. This operation did not check any of them, and the wounds healed very quickly.

The meal mixture was made up as follows: Oats (ground), 86 pounds; barley (ground), 14 pounds. Bran was fed as required to keep the digestive tract in a healthy, normal condition. The amount fed was slightly above the total amount of ground grain.

FOOD VALUES.

The bran cost $26 per ton; the grain was valued at $26 per ton; roots were valued at $2 per ton; hay, mixed (clover and timothy) at $7 per ton.

The test started on November 17, and the twelve steers were sold separately at auction March 31, 1915. The following is a detailed statement on the different lots fed:—

Lot I.

The four steers in this lot were grades that showed a little beef blood, and when finished were classed as good butchers' cattle.

Number of steers in lot		4
First weight, gross	Lb.	3,595
First weight, average	"	898·7
Finished weight, gross	"	4,480
Finished weight, average	"	1,120
Total gain in 135 days	"	885
Average gain per steer	"	221
Daily gain per steer	"	1·6
Daily gain per lot	"	6·5
Gross cost of feed	$	115 67
Cost of one pound gain	Cts.	13·1
Value of beef at beginning—3,595 pounds at 5¼ cents	$	188 74
Total cost to produce beef	"	304 41
Selling price, at 7¾ cents per pound	"	347 20
Profit	"	42 79
Profit per steer	"	10 70
Average valuation of steer at start	"	47 18
Average value price at finish	"	86 80
Average increase in value	"	39 62
Average cost of feed per steer	"	28 92
Amount of meal eaten by lot—Bran, 2,933 pounds, crushed grain, 2,879 pounds	Lb.	5,812
Amount of roots eaten by lot	"	26,532
Amount of hay eaten	"	3,882

Lot II.

The four steers in the second lot were more uniform in weight and quieter in disposition than either of the other lots. These steers were medium butchers' cattle when sold.

Number of steers in lot		4
First weight, gross	Lb.	3,285
First weight, average	"	821
Finished weight, gross	"	4,260
Finished weight, average	"	1,065
Total gain in 135 days	"	975
Average gain per steer	"	244
Daily gain per steer	"	1·8
Daily gain per lot	"	7·2
Gross cost of feed	$	109 66
Cost of one pound gain	Cts.	11·2
Value of beef at beginning—3,285 pounds at 5⅛ cents	$	168 36
Total cost to produce beef	"	278 02
Selling price, at 7½ cents per pound	"	319 50
Profit	"	41 48
Profit per steer	"	10 37
Average value of steer at start	"	42 09
Average value price at finish	"	79 87
Average increase in value	"	37 78
Average cost of feed per steer	"	27 41
Amount of meal eaten by lot—Bran, 2,778 pounds, crushed grain, 2,729 pounds	Lb.	5,507
Amount of roots eaten by lot	"	25,236
Amount of hay eaten	"	3,668

Lot III.

The four steers in this lot were lighter when the test was commenced. They were dairy steers and, though fat, they sold, on an average, at seven-eights cents per pound less than lot I, and five-eighths cents less than lot II.

Number of steers in lot		4
First weight, gross	Lb.	3,045
First weight, average	"	761
Finished weight, gross	"	3,830
Finished weight, average	"	957
Total gain in 135 days	"	785
Average gain per steer	"	196
Daily gain per steer	"	1·45
Daily gain per lot	"	5·8
Gross cost of feed	$	100 93
Cost of one pound gain	Cts.	12·8
Value of beef at beginning—3,045 pounds at 5 cents	$	152 25
Total cost to produce beef	"	253 18
Selling price, at 6⅞ cents per pound	"	263 33
Profit	"	10 15
Profit per steer	"	2 54
Average valuation of steer at start	"	38 06
Average value price at finish	"	65 83
Average increase in value	"	27 77
Average cost of feed per steer	"	25 23
Amount of meal eaten by lot—Bran, 2,635 pounds, crushed grain, 2,467 pounds	Lb.	5,102
Amount of roots eaten by lot	"	22,447
Amount of hay eaten	"	3,476

METHOD OF WORK.

Feeding.

The preliminary feeding period with rape and corn put the steers in condition and gave them a splendid start for the pen feeding which followed. The cost per steer for the month ending November 16 was estimated at $2.01; this was added to the

CHARLOTTETOWN.

original cost. The steers were fed in groups of four each, in box stalls. The roots were pulped and the meal mixed with them and fed in two feeds each day, morning and evening. The hay was of good quality. A light feed was given at noon, and the balance at night. The amount of hay eaten gradually lessened. Water was supplied as required. Any food that was not eaten up readily by a lot was removed, as some of the steers showed a tendency to gorge themselves if the others were satisfied before the feed was all eaten.

Deductions.

The ordinary steer of the country can be fed at a good profit if the feeding period is not more than five months. Many grade steers of dairy blood that have been going to the factory as "canners" or for bologna can be fed with food grown on the average farm, for a short period, at a satisfactory profit.

CHARLOTTETOWN.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

BEEF CATTLE EXPERIMENT, WINTER 1914-15.

Twenty-four steers were purchased locally during October and November, 1914, costing, on an average, 6¼ cents. This, for the Maritime Provinces, was an exceptionally high price, but beef of all kinds, during this period, was the highest it has been for some years. The very poorest class of feeders brought, during October and November, from 4½ to 5½ cents. The better class of stock was extremely hard to get at from 6 to 6½ cents, but, during the first part of December, the market began to take a turn for the worse, with the result that only a fair price was offered for a few good steers at Christmas time. Very little change took place until the latter part of April. Even then only an occasional good offer was made for first-class butcher steers. Nevertheless, hides gradually advanced in price, reaching a maximum of 18 cents the first of March, while the average run brought 17 cents per pound, but shortly dropped to 13 cents. In fact the beef market has run quite contrary to all predictions made by stockmen last fall, but there is evidence that exceptionally good prices will be offered during the latter part of May and June.

All steers purchased were well-bred Shorthorns. Twelve were in such condition that they could be classed as good butchers. The remainder were somewhat thinner, and could be classed as good stockers.

The twenty-four were divided into two main lots, namely, twelve good butchers and twelve good stockers. These in turn were divided into subjects for feeding, as follows:—

Lot 1.—Six steers, good butchers.
Lot 2.—Six steers, good stockers.
Lot 3.—Six steers, good butchers.
Lot 4.—Six steers, good stockers.

These were fed as follows: Lots 1 and 2 were fed 50 per cent more roots and meal than lots 3 and 4, respectively. Half of lots 1, 2, 3 and 4 received, in addition to their regular ration, 2 pounds molasses per steer per day.

All steers were weighed and dehorned on the 14th day of November. Three weeks later, on the 5th of December, they were again weighed and the lot found to have gained about 1,000 pounds, or 41 pounds per steer, showing they had felt the effect of dehorning but slightly. All did nicely excepting one steer which had the misfortune to strike its head, causing it to bleed. Considerable trouble was experienced in preventing too great a loss of blood, consequently he lost much in weight.

It will be noted that this experiment is a duplication of the one carried on during 1913-14.

The following tables give the results obtained:—

STEER FEEDING EXPERIMENTS AT NAPPAN, 1914-15.

COMPARISON of Lots 1 and 3, good Butchers.

—		Lot 1. "Heavy Fed"	Lot 3. "Light Fed"
Total live weight of steers, December 14, 1914	lb.	7,510	6,705
Total live weight of steers, April 5, 1915	"	8,885	8,125
Increase to April 5, 1915	"	1,375	1,420
Lot 1—			
Original weight of 6 steers, 7,510 pounds at 6¼ cts	$	469·38	....
Weight at finish of 6 steers, 8,885 pounds at 8¼ cts	"	733·01	....
Lot 3—			
Original weight of 6 steers, 6,705 pounds at 6¼ cts	"	....	419·06
Weight at finish of 6 steers, 8,125 pounds at 8¼ cts	"	....	670·31
Gross profit	"	263·63	251·25
Amount of hay consumed	lb.	10,080	10,080
Amount of meal consumed	"	3,780	2,520
Amount of roots consumed	"	37,800	25,200
Amount of molasses consumed	gal.	43·5	43·5
Cost of feed for lot, 112 days	$	143·52	112·03
Net profit	"	120·11	139·22
Daily rate of gain per steer	lb.	2·044	2·112
Cost of 1 pound gain	cts.	10·44	7·88
Cost of feed per day per steer	"	21·32	16·66
Profit per steer	$	20·02	23·21

COMPARISON of Lots 2 and 4, good Stockers.

—		Lot 2. "Heavy Fed"	Lot 4. "Light Fed"
Total live weight of steers, December 14, 1914	lb.	6,450	5,540
Total live weight of steers, April 5, 1915	"	7,865	6,725
Increase to April 5, 1915	"	1,415	1,185
Lot 2—			
Original weight of 6 steers, 6,450 pounds at 6¼ cts	$	403·13	....
Weight at finish of 6 steers, 7,865 pounds at 8¼ cts	"	648·86	....
Lot 4—			
Original weight of 6 steers, 5,540 pounds at 6¼ cts	"	....	346·25
Weight at finish of 6 steers, 6,725 pounds at 8¼ cts	"	....	554·81
Gross profit	"	245·73	208·56
Amount of hay consumed	lb.	10,080	10,080
Amount of meal consumed	"	3,780	2,520
Amount of roots consumed	"	37,800	25,200
Amount of molasses consumed	gal.	43·5	43·5
Cost of feed for lot, 112 days	$	143·52	112·02
Net profit	"	102·21	96·54
Daily rate of gain per steer	lb.	2·103	1·763
Cost of 1 pound gain	cts.	10·14	9·45
Cost of feed per day per steer	"	21·32	16·66
Profit per steer	$	17·04	16·09

NAPPAN.

COMPARISON of Sub-lot 1, good Butchers, Heavy fed.

—		Molasses.	No Molasses.
Total live weight of steers, December 14, 1914	lb.	3,555	3,955
Total live weight of steers, April 5, 1915	"	4,285	4,600
Increase to April 5, 1915	"	730	645
Molasses—			
Original weight of 3 steers, 3,555 pounds at $6\frac{1}{4}$ cts	$	222·19	....
Weight at finish of 3 steers, 4,285 pounds at $8\frac{1}{4}$ cts	"	353·51	....
No Molasses—			
Original weight of 3 steers, 3,955 pounds at $6\frac{1}{4}$ cts	"	....	247·19
Weight at finish of 3 steers, 4,600 pounds at $8\frac{1}{4}$ cts	"	....	379·50
Gross profit	"	131·32	132·30
Amount of hay consumed	lb.	5,040	5,040
Amount of meal consumed	"	1,890	1,890
Amount of roots consumed	"	18,900	18,900
Amount of molasses consumed	gal.	43·5	....
Cost of feed for lot, 112 days	$	76·11	67·41
Net profit	"	55·21	64·90
Daily rate of gain per steer	lb.	2·17	1·92
Cost of 1 pound gain	cts.	10·42	10·45
Cost of feed per day per steer	"	22·65	20·06
Profit per steer	$	18·40	21·63

COMPARISON of Sub-lot 2, good Stockers, Light fed.

—		Molasses.	No Molasses.
Total live weight of steers, December 14, 1914	lb.	3,245	3,205
Total live weight of steers, April 5, 1915	"	3,965	3,900
Increase to April 5, 1915	"	720	695
Molasses—			
Original weight of 3 steers, 3,245 pounds at $6\frac{1}{4}$ cts	$	202·81	....
Weight at finish of 3 steers, 3,965 pounds at $8\frac{1}{4}$ cts	"	327·11	....
No Molasses—			
Original weight of 3 steers, 3,205 pounds at $6\frac{1}{4}$ cts	"	....	200·31
Weight at finish of 3 steers, 3,900 pounds at $8\frac{1}{4}$ cts	"	....	321·75
Gross profit	"	124·30	121·44
Amount of hay consumed	lb.	5,040	5,040
Amount of meal consumed	"	1,890	1,890
Amount of roots consumed	"	18,900	18,900
Amount of molasses consumed	gal.	43·5	....
Cost of feed for lot, 112 days	$	76·11	67·41
Net profit	"	48·19	54·03
Daily rate of gain per steer	lb.	2·142	2·068
Cost of 1 pound gain	cts.	10·57	9·69
Cost per day per steer	"	22·65	20·06
Profit per steer	$	16·06	18·01

NAPPAN.

Comparison of Sub-lot 3, good Butchers, Light fed.

—		Molasses.	No Molasses.
Total live weight of steers, December 14, 1914	Lb.	3,205	3,500
Total live weight of steers, April 5, 1915	"	3,920	4,205
Increase to April 5, 1915	"	715	705
Molasses—			
Original weight of 3 steers, 3,205 pounds at 6¼ cts	$	200·31	....
Weight at finish of 3 steers, 3,920 pounds at 8¼ cts	"	323·40	....
No Molasses—			
Original weight of 3 steers, 3,500 pounds at 6¼ cts	"	....	218,75
Weight at finish of 3 steers, 4,205 pounds at 8¼ cts	"	....	346·91
Gross profit	"	123·09	128·16
Amount of hay consumed	lb.	5,040	5,040
Amount of meal consumed	"	1,260	1,260
Amount of roots consumed	"	12,600	12,600
Amount of molasses consumed	gal.	43·5	....
Cost of feed for lot, 112 days	$	60·36	51·66
Net profit	"	62·73	76·50
Daily rate of gain per steer	lb.	2·127	2·098
Cost of 1 pound gain	cts.	8·44	7·32
Cost of feed per day per steer	"	17·96	15·37
Profit per steer	$	20·91	25·50

Comparison of Sub-lot 4, good Butchers, Light fed.

—		Molasses.	No Molasses.
Total live weight of steers, December 14, 1914	lb.	2,625	2,915
Total live weight of steers, April 5, 1915	"	3,140	3,480
Increase to April 5, 1915	"	515	565
Molasses—			
Original weight of 3 steers, 2,625 pounds at 6¼ cts	$	164·06	....
Weight at finish of 3 steers, 3,140 pounds at 8¼ cts	"	259·05	....
No Molasses—			
Original weight of 3 steers, 2,915 pounds at 6¼ cts	"	....	182·19
Weight at finish of 3 steers, 3,480 pounds at 8¼ cts	"	....	287·10
Gross profit	"	94·99	104·91
Amount of hay consumed	lb.	5,040	5,040
Amount of meal consumed	"	1,260	1,260
Amount of roots consumed	"	12,600	12,600
Amount of molasses consumed	gal.	43·5	....
Cost of feed for lot, 112 days	$	60·36	51·66
Net profit	"	34·63	53·25
Daily rate of gain per steer	lb.	1·532	1·681
Cost of 1 pound gain	cts.	11·72	9·14
Cost of feed per day per steer	"	17·96	15·37
Profit per steer	$	11·54	17·75

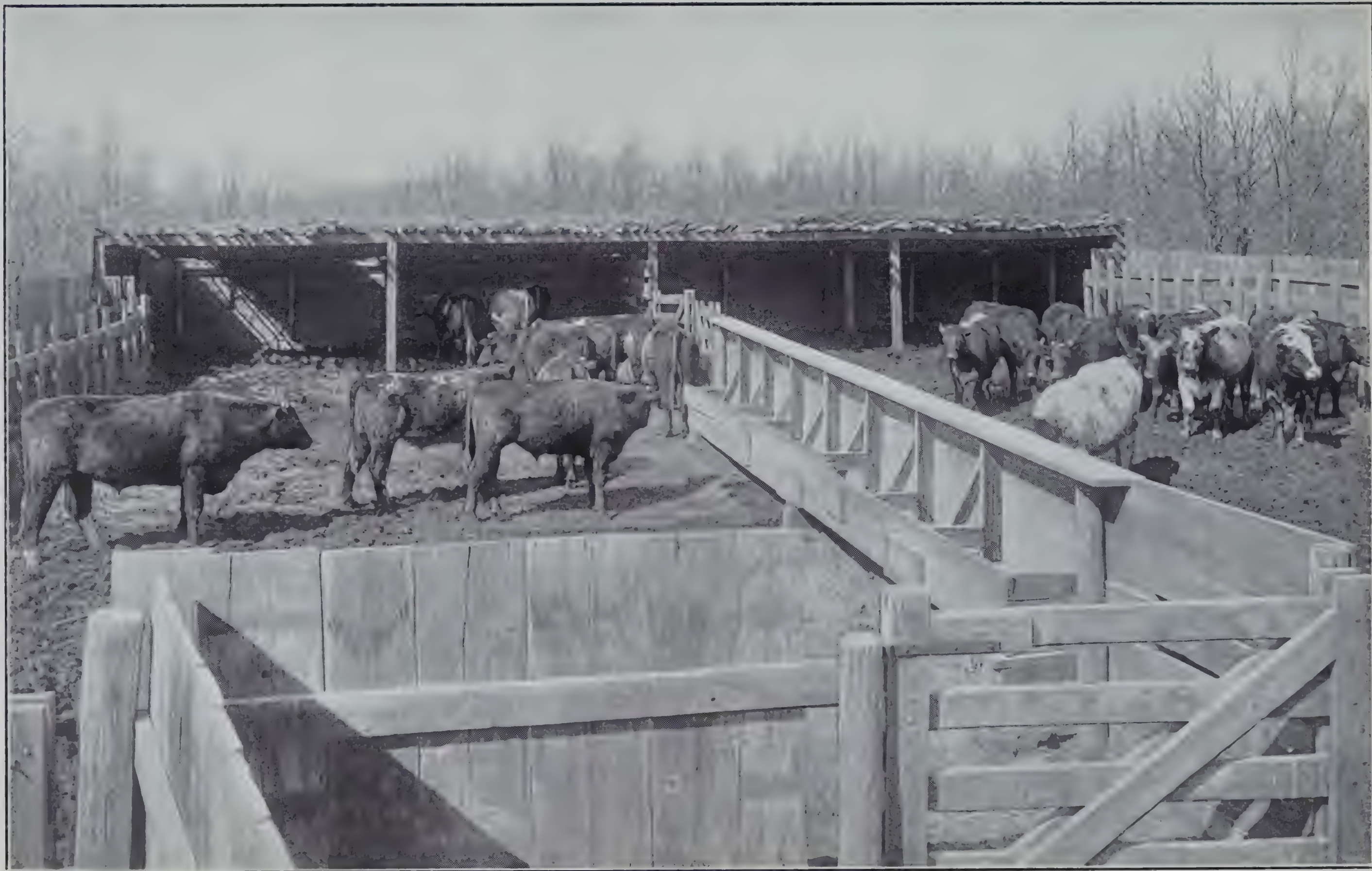
Method of work.—The steers were weighed three consecutive mornings, starting December 14, 1914, and weighed at one-week intervals (Monday morning) until the end of the feeding period, being weighed at a reasonable hour after the morning's meal, and before they were watered. Individual weights were kept. All were dehorned November 14, 1914.

Nappan.

Steers fed at Experimental Farm, Nappan, N.S., 1914-15.

Steers fed 1914-15. Experimental Station, Fredericton, N.B.

Experimental Station, Lennoxville, P.Q. Steers in feeding experiment. Loose vs. tied, 1914-15. Loose fed lot which made an average gain of 287 lbs. in 137 days against those tied 209 lbs.



Open shed and corral for out-door steer-feeding. Experimental Farm, Brandon, Man.

Group of Steers wintered outside. Experimental Farm, Indian Head, Sask.

Steer feeding Trials, 1914-15, Experimental Farm, Lacombe. Steers fed in the corral mode, the most economical gains showing a profit after paying for feed of $7.90 per head.

FEEDING.

1. Feeding period was from December 14, 1914, to April 5, 1915.

2. From December 5 to 14 was their preparatory feeding period, in which they were given roots, hay, and meal, gradually working up to a normal ration.

3. See table for period of feeding.

4. They received one feed of good English hay and one feed of good Broadleaf hay per day. Both were of excellent quality.

5. Roots consisted mostly of turnips and were weighed daily on barn scales.

6. The meal ration consisted of the following mixture: 200 pounds oats and barley (equal parts by weight); 400 pounds bran; 100 pounds cotton-seed; 100 pounds oil-cake.

The prices of feed were: Meal ration, $1.50 per hundredweight; roots, $2 per ton; hay, $8 per ton; and molasses, 20 cents per gallon.

Note the meal ration was 20 cents dearer per hundredweight this year than that fed last season.

See table as to amounts for respective periods of four weeks each.

RATION for Steers, 1914-15.

Lot.	Row.	No. of Steers	Ration per steer per day.											
			Dec. 14, 1914 to Jan. 11, 1915			Jan. 11 to Feb. 8			Feb. 8 to Mar. 8			Mar. 8 to April 5.		
			Roots.	Meal.	Molasses.	Roots.	Meal.	Molasses.	Roots.	Meal.	Molasses.	Roots.	Meal.	Molasses.
			Lb.	Lb.	3 steers. Lb.	Lb.	Lb.	3 steers. Lb.	Lb.	Lb.	3 steers. Lb.	Lb.	Lb.	3 steers. Lb.
1	1	3	60	2 to 3	1	60	3 to 4½	2	60	4½ to 6	2	45	6 to 9	2
2	1	6	60	2 to 3	1	60	3 to 4½	2	60	4½ to 6	2	45	6 to 9	2
3	2	6	40	1 to 2	1	40	2 to 3	2	40	3 to 4	2	30	5 to 6	2
4	3	6	40	1 to 2	1	40	2 to 3	2	40	3 to 4	2	30	5 to 6	2

Hay: 15 pounds per day per steer.

OBJECTS OF EXPERIMENT.

1. To show the result of feeding 50 per cent more roots and meal to heavy-weight steers.
2. To show the result of feeding 50 per cent more roots and meal to light-weight steers.
3. To show the profit in feeding the medium and heavy-weight steers.
4. To show the value of molasses in finishing beef.

DATA FROM EXPERIMENT.

While in general principles these results agree fairly well with those of 1913-14, there are, nevertheless, certain phases which do not coincide. This goes to show that definite conclusions cannot be drawn from one or even three years' experiments in feeding steers, due to such influences as the difference in the individuality of the animals, the buying and selling prices, and uniform fleshing.

Notwithstanding these drawbacks, there are a few interesting as well as valuable things to be noted. In the heavy-fed lots a greater increase in weight over the light-fed lots would be expected. In the stockers this held true, but not so in the good butchers. This may be explained by the fact that two of the good butcher steers, heavy-fed, were very fat when put in, hence very little gain was made by them. The greatest profits, therefore, were realized from the heavy-fed stockers and light-fed good butchers.

In every case except one, where molasses was added to the meal ration there was a decided increase in the total gain, but the increase was hardly sufficient to compensate for the high cost of molasses. The one exception may be explained by the fact that steer No. 3 in lot 4 was the one that bled so badly, hence his weight at the beginning was very much reduced, but later he made very rapid gains. This would tend to make the total increase for the lot fed no molasses greater than for those receiving molasses. Thus it is noted, even though a greater increase is obtained, molasses cannot be profitably fed, more especially when given in addition to a full meal ration.

One thing that must appeal to all interested in beef feeding is the fact that good profits can be realized over and above the cost of feed, when judicious buying and feeding have been practised. Purchase well-bred steers, care for them as they should be cared for, finish them as they should be finished for the market, and they will command a price that ensures a profit.

EXPERIMENTAL STATION, KENTVILLE, N. S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

STEER-FEEDING EXPERIMENT.

Twenty-four grade Shorthorn steers were purchased in November and put on a feeding test of four months, beginning December 1, 1914, and ending March 31, 1915. Sixteen of these were dehorned and allowed to run loose in pens, and eight were tied to stanchions.

Owing to the high price of beef during the summer, all the best 3-year-old steers had been picked up, and steers of this age of good quality could not be found. The steers purchased were, with few exceptions, light and not of the best conformation for beefing. Four of the steers tied were not fed molasses. In calculating the profits on the tied lot, however, each of the eight steers has been charged for an equal portion of the molasses consumed by the four. The quantity of molasses consumed by lot 3 was the same as that consumed by lots 1 and 2, otherwise the steers were all fed alike.

FEED.

Turnips were fed the first two months at the rate of 60 pounds per day, and corn ensilage the last two months at the rate of 50 pounds per day. Ten pounds of hay was fed at the beginning and lessened to 5 pounds as the grain ration was increased, or an average of 8·65 pounds per day for the feeding period.

The meal mixture was made up of and cost as follows:—

400 pounds bran at $1.27 per cwt.	$ 5 08
300 " cotton-seed at $1.85 per cwt.	5 55
100 " crushed oats at $1.50 per cwt.	1 50
100 " middlings at $1.65 per cwt.	1 65
100 " corn meal at $1.75 per cwt.	1 75

Or $31.06 per ton, or 1·55 cent per pound.

The turnips and corn ensilage were each valued at $2 per ton and hay at $12 per ton.

The cost of feed per steer for the period of 121 days was as follows:—

Turnips, 3,662 pounds at $2 per ton	$ 3 63
Corn ensilage, 2,712 pounds at $2 per ton	2 71
Hay, 1,047 pounds at $12 per ton	6 28
Grain, 728 pounds at 1·55 cent per pound	11 28
Molasses, 27½ pounds at 1·8 cent per pound	49
Total	$24 42
Cost per day for feeding period	20.18 cents.

Lot I—Best Steers, Loose.

Number of steers in lot		8
First weight, gross, December 1, 1914	Lb.	7,490
" average	"	936
Finished weight, gross, March 31, 1915	"	9,831
" average	"	1,229
Number of days in test	Days.	121
Total gain in 121 days	Lb.	2,341
Average gain per steer	"	292
Daily gain per steer	"	2·41
Daily gain per lot	"	19·34
Gross cost of feed for period	$	195 34
Cost of one pound gain per lot	Cts.	8·34
Cost, original, December 1, 1914, at $5.75 per cwt.	$	430 67
Total cost, March 31, 1915	"	626 03
Selling price, March 31, 1915, at $7 per cwt.	"	688 17
Profit per lot	"	62 14
Profit per steer	"	7 76
Average valuation per steer to start, December 1, 1914	"	53 84

Lot 1—Best Steers, Loose.—Concluded.

Average sale price per steer at finish March 31, 1915	$	86 02
Average increase in value	"	32 18
Average cost of feed per steer	"	24 42
Amount of meal eaten	Lb.	728
Amount of roots eaten	"	2,662
Amount of ensilage eaten	"	2,712
Amount of hay eaten	"	1,047
Amount of molasses eaten	"	27.5

Lot 2—Medium Steers, Loose.

Number of steers in lot		8
First weight, gross, December 1, 1914	Lb.	6,455
First weight, average	"	807
Finished weight, gross, March 31, 1915	"	8,234
Finished weight, average	"	1,029
Number of days in test	Days.	121
Total gain in 121 days	Lb.	1,779
Average gain per steer	"	222
Daily gain per steer	"	1·83
Daily gain per lot	"	14·70
Gross cost of feed for period	$	195 36
Cost of 1 pound gain per lot	Cts.	10·98
Cost, original, December 1, 1914, at $5.75 per cwt	$	371 17
Total cost March 31, 1915	"	566 53
Selling price March 31, 1915, at $7 per cwt	"	576 38
Profit per lot	"	9 85
Profit per steer	"	1 23
Average valuation per steer to start, December 1, 1914	"	46 39
Average sale price per steer at finish, March 31, 1915	"	72 04
Average increase in value	"	25 65
Average cost of feed per steer	"	24 42
Amount of meal eaten	Lb.	728
Amount of roots eaten	"	3,662
Amount of ensilage eaten	"	2,712
Amount of hay eaten	"	1,047
Amount of molasses eaten	"	27·5

Lot 3—Medium Steers, tied.

Number of steers in lot		8
First weight, gross, December 1, 1914	Lb.	6,530
First weight, average	"	816
Finished weight, gross, March 31, 1915	"	8,127
Finished weight, average	"	1,016
Number of days in test	Days.	121
Total gain in 121 days	Lb.	1,597
Average gain per steer	"	199
Daily gain per steer	"	1·64
Daily gain per lot	"	13·19
Gross cost of feed for period	$	195 36
Cost of 1 pound gain	Cts.	12·23
Cost, original, December 1, 1914, at $5.75 per cwt	$	375 47
Total cost March 31, 1915	"	570 83
Selling price March 31, 1915, at $7 per cwt	"	568 89
Loss per lot	"	1 94
Loss per steer	Cts.	24
Average valuation per steer to start December 1, 1914	$	46 93
Average sale price per steer at finish March 31, 1915	"	71 11
Average increase in value	"	24 18
Average cost of feed per steer	"	24 42
Amount of meal eaten	Lb.	728
Amount of roots eaten	"	3,662
Amount of ensilage eaten	"	2,712
Amount of hay eaten	"	1,047
Amount of molasses eaten	"	27·5

FEEDING MOLASSES.

In order to test out the value of molasses for feed eight steers as uniform as could be got were divided into two lots. These two lots were fed alike except that the steers in lot 4 received ·93 pound of molasses each per day, after February 1, in addition to the other feeds.

KENTVILLE.

It will be noticed that the two lots made practically the same gain per day from December 1 to February 1. It will be seen also that the lot receiving molasses from February 1 to March 31 made better gains during this period than the lot not receiving molasses, and that the increase was sufficient to pay for the additional outlay for molasses and give a slight profit besides. The gain in favour of the molasses-fed lot was $3.66.

Lot 4.—With Molasses.

Number of steers in lot		4
First weight, gross, December 1, 1914	Lb.	3,410
" average	"	852.5
Weight February 1	"	3,875
Number of days fed to February 1	"	62
Average gain per day to February 1	"	7.5
Finished weight, gross, March 31, 1915	"	4,237
Number of days fed from February 1 to March 31	Days.	59
Average gain per day from February 1 to March 31	Lb.	6.13
Finished weight, average	"	1,059.25
Number of days in test	Days	121
Total gain in 121 days	Lb.	827
Average gain per steer	"	206.75
Daily gain per steer	"	1.70
Daily gain per lot	"	6.83
Gross cost of feed for period	$	99 68
Cost of 1 pound gain per lot	Cts.	12.05
Cost, original, December 1, 1914, at $5.75 per cwt	$	196 07
Total cost March 31, 1915	"	295 75
Selling price March 31, 1915, at $7 per cwt	"	296 59
Profit per lot	Cts.	84
Profit per steer	"	21
Average valuation per steer to start, December 1, 1914	$	49 01
Average sale price per steer at finish March 31, 1915	"	74 14
Average increase in value	"	25 13
Average cost of feed per steer	"	24 92
Amount of meal eaten	Lb.	728
" roots eaten	"	3,662
" ensilage eaten	"	2,712
" hay eaten	"	1,047
" molasses eaten	"	55

Lot 5.—Without Molasses.

Number of steers in lot		4
First weight, gross, December 1, 1914	Lb.	3,120
" average	"	780
Weight, February 1, 1915	"	3,595
Number of days fed to February 1, 1915	Days.	62
Average gain per day to February 1	Lb.	7.66
Finished weight, gross, March 31, 1915	"	3,890
Number of days fed from February 1, to March 31	Days	59
Average gain per day from February 1 to March 31	Lb.	5
Finished weight average	"	972.5
Number of days in test	Days.	121
Total gain in 121 days	Lb.	770
Average gain per steer	"	192.5
Daily gain per steer	"	1.59
Daily gain per lot	"	6.36
Gross cost of feed for period	$	95 72
Cost of 1 pound gain	Cts.	12.4
Cost, original, December 1, 1914, at $5.75 per cwt	$	179 40
Total cost, March 31, 1915	"	275 12
Selling price, March 31, 1915, at $7 per cwt	"	272 30
Loss per lot	"	2 82
Loss per steer	"	70
Average valuation per steer to start, December 1, 1914	"	44 85
Average sale price per steer at finish, March 31, 1915	"	68 08
Average increase in value	"	23 23
Average cost of feed per steer	"	23 93
Amount of meal eaten	Lb.	728
" roots eaten	"	3,662
" ensilage eaten	"	2,712
" hay eaten	"	1,047

KENTVILLE.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

STEER FEEDING—SPRING OF 1914.

At the end of the last fiscal year, March 31, 1914, there were in the stables here thirty-six steers that were put in to feed on the 8th of January. They were a rough lot, mostly grade Holsteins, but the only cattle available in the district at that time.

They were bought and fed to turn some of the rough crops of the Farm into manure, and no experimental work was attempted with them. On account of their type and the purpose for which they were used they were not grain-fed as heavily as would ordinarily have been the case.

Until the 1st of April their feed consisted of:—

Hay, 28 tons at $8 per ton		$ 224 00
Turnips, 2,000 bushels at 8 cents per bushel		160 00
Bran, 4,500 pounds at $18 per ton		40 50
From the 1st of April to the 27th May they were fed—		
Hay, 16 tons 1,353 pounds at $8 per ton		133 42
Corn ensilage, 44 tons 920 pounds at $2.50 per ton		111 15
Bran, 4 tons 892 pounds at $18 per ton		80 03
Oats, 2 tons 446 pounds at $33 per ton		73 36
Cotton-seed meal, 1,638 pounds at $40 per ton		32 76
Oil cake, 1,638 pounds at $36.20 per ton		29 65
Molasses, 150 gallons at 20 cents per gallon		30 00
		$ 914 87
Cost of cattle	$ 2,000 00	
Less 3 heifers	180 00	
		1,820 00
		$ 2,734 87
24 head sold at 6¾ cents per pound, weight after shrinkage, 25,065 pounds	$ 1,691 88	
12 head sold at 5⅞ cents, 9,865 pounds	579 56	
		2,271 44
Loss		$ 463 43

The loss on this transaction was due: first, to the poor type of cattle; and second, to the fact that when they were bought the winter was partially over and beef then was considerably higher than when they were sold.

STEER FEEDING—WINTER 1914-15.

In October, 1914, thirty-three steers and three heifers were bought to feed for beef. They were run on a bush pasture till the 7th of November, getting a daily feed of white turnips while there. They were then stabled and white turnips not topped were fed to them liberally with 12 pounds of hay per day until November 15, when 3 pounds daily of a grain ration composed of four parts bran, two parts cottonseed meal, and one part nutted oil cake were given The steers were divided into three classes: eleven choice, eleven fair, and eleven dairy type. The choice lot were all Shorthorn grade, the fair were part Shorthorn and some of evident Ayrshire breeding, while the dairy type were Holstein grades and scrubs.

Object of Experiment.—To test the feeding gains to be made by choice and fair type beef steers and dairy type steers:—

—		Choice.	Fair.	Dairy.	Total.
Number of animals in each group		11	10	10	31
First weight, gross, November 15	lb.	11,045	8,660	8,580	28,285
First weight, average, November 15	"	1,004	866	858	912·4
Finished weight, gross, April 1	"	13,555	10,815	10,230	34,600
" average, April 1	"	1,232·2	1,081·5	1,023	1,116·1
Number of days in experiment	days	135	135	135	135
Total gain for period	lb.	2,510	2,155	1,650	6,315
Average gain per animal	"	228·1	215·5	165	203 71
" daily gain for group)	"	18·59	15·95	12·22	46·7
" " per animal	"	1·69	1·59	1·22	1·5
Quantity meal eaten by group for period	"	9,856	8,960	8,960	27,776
" roughage, for period	"	91,520	83,200	83,200	257,920
Total cost of feed per group	$	349 25	317 50	317 50	984 25
Cost of feed per head for period	$	31 75	31 75	31 75	31 75
" per day	cts.	23½	23½	23½	23½
Cost to produce 1 pound gain	"	14	15	19	15½
Original cost of animals per group	$	702 76	535 55	498 99	1,737 00
" plus cost of feed	$	1,052 01	853 05	816 49	2,721 25
Selling price at $7.50 per 100 pounds	$	1,016 63	811 13	....	1,827 76
Selling price at $7 per 100 pounds	$	....	....	716 10	716 10
Net loss per group	$	35 38	41 92	100 39	177 39
" animal (average)	$	3 22	4 19	10 03	5 72
Nutritive ratio of total ration	1: 5·57				
" meal ration	1: 2·05				
Dry matter required to produce 1 pound gain	lb.	14·94	15·81	20·65	16·77
Digestible matter required to produce 1 pound gain	"	9·72	10·24	13·44	10·44
Meal required to produce 1 pound gain	"	3·92	4·15	5·43	4·39
Roughage required to produce 1 pound gain	"	36·47	38 6	50·42	40·84

FREDERICTON.

Object of Experiment.—To test relative gains made by feeding steers when tied and loose.

Feed given.—Hay, turnips, corn, ensilage, bran, cottonseed meal, oilcake.

—		Tied.	Loose.	Total.
Number of animals in each group		19	12	31
First weight, gross, November 15	lb.	17,795	10,490	28,285
" average, November 15	"	936·6	874·2	912·4
Finished weight, April 1	"	21,460	13,140	34,600
" average, April 1	"	1,129·4	1,095	1,116·1
Number of days in experiment	days	135	135	135
Total gain for period	lb.	3,665	2,650	6,315
Average gain per animal	"	192·90	220·83	203·71
" daily gain for group	"	27·1	19·5	46·7
" " per animal	"	1·4	1·6	1·5
Quantity meal eaten by group for period	"	17,024	10,752	27,776
" roughage eaten by group for period	"	158,080	99,840	257,920
Total cost of feed per group	$	603 25	381 00	984 25
Cost of feed per head for period	$	31 75	31 75	31 75
" " per day	cts.	23·5	23·5	23·5
" to produce 1 pound gain	cts.	16·	14·	15·5
Original cost of animals per group	$	1,115 30	622 00	1,737 00
" plus cost of feed	$	1,718 55	1,003 00	2,721 25
Selling price at $7.50 per 100 pounds	$	1,124 63	703 13	1,827 76
" $7. per 100 pounds	$	452 55	263 55	716 10
Net loss per group	$	141 37	36 32	177 39
" animal (average)	$	7 44	3 02	5 72
Nutritive ratio of total ration	1: 5·57			
" meal ration	1: 2·05			
Dry matter required to produce 1 pound gain	lb.	17·71	15·43	16·77
Digestible matter required to produce 1 pound gain	"	11·53	10·89	10·44
Meal required to produce 1 pound gain	"	4·64	4·05	4·39
Roughage required to produce 1 pound gain	"	43·13	37·68	40·84

FINANCIAL STATEMENT.

EXPENDITURES.

7 steers, 7,330 pounds at $6.75 per 100 pounds	$ 494 77
19 steers, 17,055 pounds at $6.15 per 100 pounds	1,048 88
3 steers, 2,300 pounds at $5 per 100 pounds	115 00
4 steers, 3,450 pounds at $6 per 100 pounds	207 00
Hay, 25 tons 1,840 pounds at $10 per ton	250 92
Turnips, 2,464 bushels at 8 cents per bushel	197 12
Ensilage, 45 tons 200 pounds at $3 per ton	135 30
Bran, 8 tons 384 pounds at $24.83 per ton	203 40
Cotton-seed meal, 4 tons 192 pounds at $34.50 per ton	141 31
Oilcake, 2 tons 96 pounds at $38.50 per ton	78 85
	$ 2,872 55

RETURNS.

By sale, 6 steers, 6,065 pounds at 7 cents	424 55
" 25 steers, 28,550 pounds at $7\frac{1}{2}$ cents	2,141 25
" 2 unthrifty steers, killed, inspected, and passed	88 28
Balance, loss on steers	218 47
	$ 2,872 55

The high price of feeding cattle in October, and high cost of feed and partial loss of two steers all contributed to this adverse balance.

FREDERICTON.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

BEEF CATTLE.

Seventy-nine stockers were purchased on the Toronto market in the month of July, for feeding purposes at this Station. When freight and expenses were added, the average cost of these steers was $61.55 per head, or 7½ cents per pound.

These steers were turned out in the rough pasture lands, which, up to this time, had had no stock on them, leaving the grass, which was not of a very good quality, very dry and hard. As a result, the cattle made very little gain while at pasture. These cattle were brought into the barns on October 28, and the following experiments were carried on:—

Loose *versus* tied feeding;
Light silage and heavy grain *versus* heavy silage and light grain.

We had the the misfortune to lose two of these steers one being shot in pasture by a stray bullet and the other going down in slaughter.

The high price of beef when these were bought, the misfortune of losing two, the high cost of feed, and the slump in the beef market in the spring of 1915 caused this lot of cattle to be kept at an average loss of $6.11 per head.

LOOSE *versus* TIED.

—		Lot No. 1. "Loose"	Lot No. 2. "Tied"
Number of steers in lot		6	6
First weight, gross, November 7, 1914	lb.	5,322	5,440
First weight, average	"	887	907
Finished weight, gross, March 30, 1915	"	7,048	6,695
Finished weight, average	"	1,175	1,116
Total gain in 143 days	"	1,726	1,255
Average gain per steer	"	288	209
Daily gain per steer	"	2·01	1·46
Cost of feed for period	"	142·08	142·08
Actual value at beginning of experiment, at 6 cts per pound	$	319·32	326·40
Total cost, including cost of feed	$	461·40	468·40
Selling price, March 30, 1915, at 7½ cents per pound	$	528·60	502·12
Profit per lot	$	67·20	33·64
Profit per steer		15·20	5·60
Average value per steer at start	$	43·22	54·40
Average cost of feed per steer	$	23·68	23·68
Average selling price per steer	$	88·10	83·70
Average profit per steer	$	11·20	5·60

Amount of feed consumed per steer:—

			Per Ton.
140½	pounds	cotton-seed meal, at	$32 50
140½	"	oil-cake meal, at	33 00
313½	"	bran, at	24 00
148	"	barley, at	34 00
5,718	"	silage, at	3 00
848	"	hay, at	10 00

LIGHT Silage and heavy grain *versus* Heavy Silage and light grain.

—		Lot 1.	Lot 2.
Number of steers in lot		4	4
First weight gross, November 26, 1914	lb.	3,859	3,942
First weight, average	"	965	985
Finished weight, gross, March 30, 1915	"	4,452	4,625
Finished weight, average	"	1,113	1,156
Total gain in 124 days	"	593	683
Average gain per steer	"	148	170
Daily gain per steer	"	1·193	1·371
Actual value of steers at commencement of experiment at 6 cents per pound	$	31·54	236·52
Total cost of feed	$	99·24	81·48
Total cost, including cost of feed	$	330·78	318·00
Selling price, March 30, 1915, at 7½ cents per pound	$	333·90	346·87
Profit	$	3·12	28·87
Average value of steer at start	$	57·88	59·13
Average cost of feed per steer	$	24·81	20·37
Average selling price per steer	$	83·47	86·71
Average profit per steer	$	0·78	7·21

Amount of feed consumed per steer, lot No. 1—

			Per Ton.
217 7/12	pounds	of cotton-seed meal, at	$32 50
217 7/12	"	oil-cake meal, at	33 00
435⅙	"	bran, at	24 00
228⅔	"	barley, at	34 00
3,010	"	silage, at	3 00
812	"	hay, at	10 00

Amount of feed consumed per steer, lot No. 2—

			Per Ton.
114⅓	pounds	of cotton-seed meal, at	$32 50
114⅓	"	oil-cake meal, at	33 00
228⅔	"	bran, at	24 00
123⅔	"	barley, at	34 00
5,208	"	silage, at	3 00
798	"	hay, at	10 00

SUMMARY of Steer Feeding.

Cost of 79 steers	$ 4,862 52
Average cost per head	61 55
Cost of feed for 79 steers	1,945 25
Average cost of feed per head	24 62
Total cost of 79 steers, including cost of feed	6,807 77
Average total cost per head, including cost of feed	86 17
Selling price of 79 steers	6,324 82
Average selling price per head	80 06
Total loss	482 95
Average loss per head	6 11

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In reckoning cost of feed for these cattle, values were figured as follows:—

	Per Ton.
Hay	$10 00
Silage	3 00
Bran	24 00
Cotton-seed meal	32 50
Oil-cake meal	33 00
Barley meal	34 00

These cattle were fed, at the commencement, a ration of 50 pounds of silage, 5 pounds of hay, and 3 pounds of meal, composed of two parts of bran, one part of cotton-seed meal, and one part of oil-cake meal, which grain ration was gradually increased through the feeding season and at time of sale they were receiving 6½ pounds of meal daily, composed of three parts of bran, two parts of oil-cake meal, two parts of cotton-seed meal, and one part of barley meal. The hay was increased to 7 pounds and silage decreased to 25 pounds.

LENNOXVILLE.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

STEER FEEDING EXPERIMENTS.

All the breeding cattle on this Farm are handled as a dairy herd, and are reported in the Dairy section of the report, even though some of them are pure-bred Shorthorns of beef breeding. The only beef cattle, fed and handled as such, are the feeding steers purchased each fall for experimental feeding during the winter.

CORN SILAGE VERSUS DRY CORN FODDER.

The experiment in steer-feeding which was tried during the winter of 1913-14, was a test of corn silage *versus* dry corn fodder as part of the ration. A carload of fairly good steers was purchased in Winnipeg stock yards at 6 cents per pound, in November, 1913. Freight, commission, and shrinkage brought the cost up to $6.40 per cwt. when they were weighed in at the Experimental Farm. They were divided into two very nearly equal lots. Both lots were fed during the winter in the stable in large box-stalls. They were dehorned at the beginning of the experiment. One steer in lot 2 bled badly when dehorned, but recovered afterwards. One lot was fed corn silage, and the other lot received dry corn fodder which had been cured in stooks and kept in the field until required. Both kinds of corn were analysed, and they were fed in such quantities that the same amount of the actual solid matter of the corn was eaten by each steer. Except for the corn, the feed given to each lot was identical. Both lots got cut straw mixed with the corn, and toward the end of the test this was supplemented with some alfalfa hay. They were fed oat and barley chop, commencing with 2 pounds per steer daily and gradually increasing to 14 pounds per steer daily; the quantity used for a longer time than any other was 8 pounds per steer daily.

The experiment was finished on May 15, 1914. The steers were sold at $7.60 per cwt., farm weights, 5 per cent off for shrinkage. It will be observed that the margin between buying and selling prices is only $1.20 per cwt., or even less when the allowance for shrinkage is considered. This is too small a margin for six months' feeding, and the profits are small even though the steers made exceptionally good gains. No allowance is made for labour; when this is considered the dry corn fodder steers were handled at a loss, while the other lot just about paid their way.

The results in tabular form are as follows:—

STEER-FEEDING EXPERIMENT 1913-14.

		Lot 1. Fed Corn Fodder.	Lot 2. Fed Ensilage.
Number of steers in lot		10	10
First weight, gross, November 15, 1913	lb.	10,265	10,240
First weight, average	"	1,026½	1,024
Finished weight, gross, May 15, 1914	"	12,865	13,645
Finished weight, average	"	1,286½	1,364½
Total gain in 181 days	"	2,600	3,405
Average gain per steer	"	260	340½
Average daily gain per steer	"	1·44	1·88
First cost of steers, at $6.40 per cwt	$	656·96	655·36
Total cost of feed	$	260·66	262·25
Total cost	$	917·62	917.61
Receipts from sale, at $7.60 per cwt., 5 per cent off for shrinkage	$	928·87	985·18
Profit	$	11·25	67.57
Average cost per steer	$	65·70	65·54
Average cost of feed per steer	$	26·06	26·22
Average selling price per steer	$	92·89	98·52
Average profit per steer	$	1·13	6·76
Average cost of 1 pound gain	cts.	10·02	7·70
Returns realized for 100 pounds oats and barley	$	1 07	1 45
Amounts of feed used—			
Oat and barley chop, at $20 per ton	lb.	14,960	14,960
Straw, at $2 per ton	"	12,305	13,444
Alfalfa, at $12 per ton	"	2,464	2,464
Corn silage, at $3 per ton	"	....	56,290
Dry corn fodder, at $6.75 per ton	"	24,885	....

While the financial results are not very satisfactory, the results on the question of the best method of storing corn fodder are quite clear and form strong evidence in favour of building silos. The steers on silage made an average gain of 340½ pounds in the six months, or 1·88 pound per day. The steers on dry corn fodder gained 260 pounds each on the average, or 1·44 pounds per day. While they were all sold at the same rate, the several buyers who inspected them all agreed that those which had received the silage were really worth from ¼ to ½ cent more per pound than the others.

EXPERIMENT FOR 1914-15.

Two carloads of steers were purchased in November, 1914, for experimental work during the present winter. They are of much the same type as the ones used in the previous experiment and cost the same price, 6 cents per pound in Winnipeg stock yards. They have been divided into four lots, and experiments both in regard to housing and feeding are being conducted. Two lots are being fed in large box stalls in the stable, and two lots are fed in a corral outdoors with only an open shed for shelter. Of the two indoor lots, one receives mixed hay for roughage, and the other corn ensilage and straw. Of the two outdoor lots, one receives mixed hay for roughage, and the other alfalfa hay. All four lots are fed exactly the same grain ration. Up to March 31, all four lots have done fairly well, and no decisive results are apparent.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MacBEAN, B.S.A.

BEEF CATTLE

As the work with the breeding herd of Shorthorns is the development of the dual-purpose cow, it follows that our interest with beef cattle is principally the feeding of steers for market. Although the herd possesses several cows that are of beef conformation, the aim is gradually to eliminate such, retaining only those that conform more to the requirements of the milking Shorthorn.

STEER FEEDING EXPERIMENTS.

In the steer-feeding work, several very interesting and profitable experiments were carried on during the past season.

On October 8 last, four steers belonging to a local dealer were placed in our stables to be fed for the Christmas market. They were accepted at 6½ cents per pound, and were to be re-delivered at 7½ cents per pound. This margin, though narrow, gave profitable returns for the labour and feeding, due to the satisfactory gains which the steers put on.

RESULTS of Experiment.

	Weight on Oct. 8.	Weight when re-delivered.	Gain.	Dates when re-delivered.
	Lb.	Lb.	Lb.	
No. 1	1,215	1,320	105	Dec. 15
No. 2	1,180	1,350	170	Dec. 28
No. 3	1,050	1,200	150	Dec. 28
No. 4	1,035	1,100	65	Dec. 1

Original value, 4,480 pounds at 6½ cents per pound		$ 291 20
Out-going value, 4,970 pounds at 7½ cents per pound		372 75
Increase in value	$ 81 55	
Interest on $291.20 at 8 per cent per annum	4 55	
Amount due the Farm for feed and labour		$ 77 00
Cost of feed—		
Roots, 10,847 pounds at $2 per ton	$ 10 85	
Barley, 984 pounds at $24 per ton	11 80	
Oats, 984 pounds at $24 per ton	11 80	
Peas, 492 pounds at $28 per ton	6 90	
Hay, 1,625 pounds at $10 per ton	8 15	
Total cost of feed		$ 49 50
Profit over cost of feed		$ 27 50

This leaves a balance of $27.50 in favour of the Farm and, as the value of the manure is considered a recompense for labour involved, the foregoing steers made fair returns even on a 1-cent margin.

From the same firm six steers were taken over on December 1, under the same conditions as the former except that a margin of 1¼ cents per pound was to be allowed, while the steers were to be fed for Easter. These were valued at the outset at 6 cents per pound and returned at 7¼ cents per pound.

Results.

Value on December 1, 6,080 pounds at 6 cents per pound..	$ 364 80	
Value on March 30, 7,505 pounds at 7¼ cents per pound..	544 10	
Increase in value..	$ 179 30	
Interest on $364.80 for 118 days at 8 per cent.. ..	9 45	
Amount due the Farm for feed and labour..		$ 169 85
Cost of feed (same materials as fed the former four steers, and valued at same price)..		$ 126 30
Profit over cost of feed..		$ 43 55

This sum of $43.55 is considered a fair profit.

Experience showed the above system of feeding to be quite profitable even with a 1-cent margin.

STEERS PURCHASED IN THE FALL OF 1914.

Forty steers, of which twenty-eight were 2-year-olds and the remainder 3-year-olds, were purchased locally at a price of $6.15 per hundred pounds for the 2-year-olds, and $6.50 per hundred pounds for the 3-year-olds. These were put on their different feeding tests on December 1, the experiments concluding on May 10—a period of 160 days.

Results show a larger profit this season than last, because of the wide margin between the buying and selling prices. The steers were all sold for $8.50 per hundred pounds, thus giving a spread of 2 cents per pound between the buying and selling prices of the 3-year-olds and a spread of 2⅓ cents per pound in the case of the 2-year-olds; the latter outrunning the former, as was our experience last year also. This year's gains, however, were not so satisfactory as those of last year, the average daily gain per head being 1·5 pounds as contrasted with that of 2·3 pounds while, further, the highest gain per day made last year was 3 pounds as compared with 2·7 pounds this season.

The steers fed a year ago had the advantage of much better feed, whereas this winter's lot were unfortunate in getting inferior rations, as to quality of straw, hay, and ensilage. The steers fed this season were of a superior type to those under test last year and, though the gains were not so good, yet they gave higher profits by reason of the very satisfactory spread between the buying and selling prices.

Although one animal, then, may make much more economical gains than another, the latter may yield the greater profit, as results depend so much on the margin between the buying and selling prices.

The following outline describes the allocation of the steers in groups and lots, together with the rations fed the different animals.

PLAN OF EXPERIMENT.

Group.	Lot 1. 2-year-olds. No. of steers.	Lot 2. 3-year-olds. No. of steers.	Ration.
1	6 (outside)..........	6 (outside)..........	Oat straw, prairie hay, and meal composed of equal parts of barley and oats.
2	6 (outside—loose)...	2 (inside—loose).....	Oat straw, prairie hay, and meal composed of equal parts of barley and oats.
3	4 (inside—tied).....	....	Oat straw, prairie hay, and meal composed of equal parts of barley and oats.
4	4 (inside—tied).....	....	Oat straw, oat sheaves, and same meal.
5	4 (inside—tied).....	4 (inside—tied).....	Oat straw, prairie hay, silage, and same meal.
6	4 (inside—tied).....	....	Oat straw, prairie hay, silage, and meal composed of barley, oats, peas, bran, and oil cake when finishing.

The experiment included a comparison of 2-year-olds and 3-year-olds; steers fed inside compared with those fed outside and getting the same feed; and also a comparison between different rations.

The experienced feeder might criticize certain of the foregoing rations, but one must make use of the feeds at his disposal, and in these experiments only such feeds as could be utilized by the average farmer in the district were used. Even wheat straw, as well as oat and barley straw, was fed this winter, and it is well known how little feed value wheat straw possesses.

The following table summarizes results, while a few explanatory remarks thereon are appended:—

RESULTS of Steer-feeding Experiments.

—		Group 1, Outside Loose.		Group 2, Inside Loose.		Group 3, Inside Tied	Group 4, Inside Tied	Group 5, Inside Tied		Group 6, Inside Tied
		Lot 1, 2-year-olds.	Lot 2, 3-year-olds.	Lot 1, 2-year-olds.	Lot 2, 3-year-olds.	Lot 1, 2-year-olds.	Lot 1, 2-year-olds.	Lot 1, 2-year-olds.	Lot 2, 3-year-olds.	Lot 1, 2-year-olds.
Number of steers in experiment		6	6	6	2	4	4	4	4	4
Number of days in experiment		160	160	160	160	160	160	160	160	160
Total weight at beginning of experiment	lb.	6,370	7,485	5,955	2,710	3,780	3,865	4,035	5,420	4,385
Total weight at end of experiment	"	8,005	9,270	7,670	3,315	4,685	4,790	4,905	6,235	5,225
Gain during period	"	1,635	1,785	1,715	605	905	925	870	815	840
Gain per head	"	272·5	297·5	285·8	302·5	226·25	231·25	217·5	203·75	210
Daily gain per head	"	1·7	1·8	1·78	1·89	1·41	1·44	1·3	1·27	1·3
Amount of meal eaten by lot	"	8,900	10,450	8,900	3,480	5,930	5,930	5,300	8,086	5,300
Amount of mixed hay eaten by lot	"	8,820	8,850	8,820	2,940	5,880	....	5,000	5,200	4,800
Amount of straw eaten by lot	"	4,000	4,000	4,000	1,300	2,600	2,600	1,680	2,600	1,680
Amount of ensilage eaten by lot	"	....	....	....	....	....	....	16,630	19,532	16,630
Number of oat sheaves eaten by lot		....	....	....	....	....	1,624	....	....	....
Total cost of feed	$	153·90	171·65	153·90	57·22	101·86	153·66	110·22	148·73	111·87
Cost of feed per head	$	25·65	28·60	25·65	28·61	25·46	38·41	27·55	37·18	27·96
Cost of feed per head per day	$	0·16	0·17	0·16	0·17	0·15	0·24	0·17	0·23	0·17
Cost to produce 1 pound gain	$	0·094	0·096	0·08	0·09	0·11	0·16	0·13	0·19	0·13
Original cost of steers	$	391·75	486·52	366·23	176·15	232·47	237·70	248·15	352·30	269·68
" plus cost of feed	$	545·65	658·17	520·13	233·37	334·33	391·36	358·37	501·03	381·55
Total receipts from sale	$	680·43	787·95	651·95	281·78	398·23	407·15	416·93	529·98	444·13
Net profit on lot	$	134·78	129·78	131·82	48·41	63·90	15·79	58·56	28·95	62·58
Net profit per steer	$	22·46	21·63	21·97	24·20	15·97	3·94	14·64	7·24	15·64

A glance at the table shows that the steers fed "loose" gave far better returns than those "tied." Steers fed outside gave larger profits than those similarly fed inside "tied," while those fed the same as the former two groups but inside and "loose" gave best results of all.

Until an "old-time" winter is experienced, results as to the outdoor feeding are not absolute; for though returns this year and last were most satisfactory in this regard, yet one must remember that both these winters were exceptionally mild.

With reference to the feeding "inside loose," results in favour thereof might possibly be greater still were the accommodation available in the stable suitable. These steers were fed in a closed implement shed, and were not as warm as if in the stable.

Results with those fed oat sheaves show little in favour of this ration, there being always a certain amount of waste, together with a lack of uniformity of quality in the feed.

Although variety in the ration gives usually best results, we are unfortunately unable to substantiate that fact this season with reference to those rations in which ensilage was included. The reason is that the ensilage was of very poor quality, the corn having been frozen in August, and it was fed this season, not to test the value of this roughage, but rather as a means to its disposal.

The ration in which the best meal mixture was fed was also upset by the quality of the ensilage, as results prove. Last year this ration gave best results of all, while the next was that in which ensilage was also fed, the meal mixture in same being less expensive, however.

This year's results in the steer-feeding experiments are altogether most gratifying; the total profit, after allowing for a shrinkage of 5 per cent, being $641.25 or a little over $16 per head, some steers having made as high as $24 profit.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

STEER-FEEDING EXPERIMENT.

An experiment was conducted during the winter of 1914-15 to compare the value of alfalfa as a roughage when fed alone or fed in conjunction with oat sheaves or with dry corn fodder, also a comparison of alfalfa fed alone and oat sheaves fed alone. To carry on this experiment, eighty-four steers were purchased and divided at the beginning into four lots as nearly equal in point of age, weight, and conformation as possible. They were all dehorned except lot 4. The dehorning gave them a slight setback but later they became more docile.

The four lots were fed all the roughage they would eat up clean, and had access to water at all times. There was an unusual amount of stormy weather with snow, which makes a condition that is more unfavourable for outside feeding than severe cold without the snow.

PLAN OF EXPERIMENT.

The four lots received the same amount of meal, which consisted of barley moderately finely ground. The roughage varied with each group. Group I received alfalfa; group II, alfalfa and oat sheaves; group III, oat sheaves; group IV, alfalfa and corn fodder. In lot IV the original plan was to feed three-quarter corn fodder and one-quarter alfalfa, but owing to a limited supply of corn fodder it was replaced in the early part of the experiment, to a greater or less extent, with oat sheaves. By February 23 the supply of corn fodder was exhausted, so that group IV was sold and the other three groups were fed on to about the beginning of May. The gains made were small and the profits not large owing to the relatively narrow margin between the buying and selling prices. The gain, however, was reasonably satisfactory when it is taken into consideration that the steers finished off on 7 pounds of chop per day. Owing to the high price of grain and the low prevailing prices of beef, the marketing of grain "on the hoof" did not look very alluring at the beginning of the winter. The results obtained, although not showing a very great net profit, should be encouraging to the farmers contemplating feeding alfalfa, as the test gives an indication as to what can be expected, even when conditions are unfavourable so far as prices are concerned.

STEER-feeding Experiment.

		Group I.	Group II.	Group III.	Group IV.
Number of steers in group		19	21	21	21
First weight, gross, (December 17, 1914)	lb.	21,032	23,220	23,168	22,860
First weight, average	"	1,107	1,106	1,103	1,088
Finished weight, gross, (April 26, April 30, May 3, and February 23, respectively)	"	23,106	25,930	25,500	24,952
Finished weight, average	"	1,216	1,235	1,214	1,188
Total gain for period (130, 134,137, and 68 days)	"	2,074	2,710	2,332	2,092
Average gain per steer	"	109	129	111	100
Average daily gain per steer	"	0·83	0·96	0·81	1·47
Amount of meal eaten by group	"	15,263	16,513	16,954	6,863
Amount of alfalfa hay eaten by group	"	56,638	34,845	....	17,240
Amount of oat sheaves eaten by group	"	....	35,240	58,390	6,195
Amount of corn fodder eaten by group	"	....	....	....	16,365
Amount of salt eaten by group	"	120	150	134	63
Total cost of feed	$	493 66	551 90	462 83	244 59
Cost of feed per steer	$	25 98	26 28	22 03	11 65
Cost of feed per steer per day	$	0 20	0 19	0 16	0 17
Cost to produce 1 pound gain	$	0 23	0 20	0 19	0 11
Original cost of group, including freight, etc	$	1,243 48	1,374 37	1,374 47	1,374 47
Original cost of group plus cost of feed	$	1,737 14	1,926 27	1,837 30	1,619 06
Selling price at $7.55, $7.75, $7.75, and $6.75 per hundred pounds	$	1,744 50	2,009 57	1,976 25	1,684 26
Net profit per group	$	7 36	83 30	138 05	65 20
Net profit per steer	$	0 38	3 96	6 61	3 15

In computing the above, the prices charged were:—

	Per ton.
Alfalfa	$ 12 00
Oat sheaves	10 00
Corn fodder	5 00
Barley chop	20 00
Salt at actual cost.	

The usual practice at the Experimental Station is to take three crops of alfalfa off the irrigated land. The third cutting is apparently somewhat risky to feed to steers, unless in combination with some other roughage, because of its tendency to cause bloat or tympanitis, and the loss of one or more animals runs away with the profits in steer feeding. It would appear to be safer for the feeder who is feeding alfalfa for the first time to take some precautions and, if possible, feed along with it oat sheaves, prairie hay, possibly good green straw, or any other available roughage. Not only will more feed be consumed, but the danger of bloating will be overcome.

The steers were sold locally and the weight quoted was that obtained at the stock-yards, a distance of two miles from the Station. At the completion of the corn fodder, Group IV was sold at a profit when there was only a ¾-cent margin between the buying and selling price. The corn fodder, along with alfalfa, makes practically a balanced ration. This combined with the palatability, makes it an excellent combination.

The alfalfa and oat sheaves group made most profitable gains when fed for twice the period of group IV. This again shows the advisability of introducing a supplement to give variety and widen the nutritive ratio. The reason for the higher net returns from oat sheaves as compared with alfalfa can be explained from the fact that the oat sheaves are valued at $10 per ton and alfalfa at $12 per ton. Were both the feeds valued at the same price, alfalfa would result in not only more gains but cheaper gains.

Cost of steers, including freight		$ 5,497 49
Cost of feed		1,802 51
Scale charges		4 10
Selling price	$ 7,408 44	
Net profit		104 34
	$ 7,408 44	$ 7,408 44

LETHBRIDGE.

EXPERIMENTAL STATION, LACOMBE, ALBERTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

BEEF CATTLE.

The herd of pure-bred Aberdeen Angus cattle now numbers twenty-five head. During the year the herd has unfortunately been subjected to loss from blackleg. A peculiar feature of this attack was the fact that fully mature animals included in the regular breeding herd were not immune. Immediately after the disease was diagnosed, the entire herd was vaccinated, and no losses were sustained ten days after treatment. The vaccinations have been repeated at intervals of six months and, having taken this precaution, it is hoped that no recurrence of the disease will take place.

There are a number of promising heifer calves being reared, and as the herd bull "Elm Park Ringleader 7th" is leaving animals of strong individuality, the value of the Angus herd is constantly increasing. A number of pure-bred yearling bulls have been disposed of, at reasonable prices, during the year.

GAINS OF YOUNG CATTLE ON PASTURE.

With the object of securing information as to the gains made by yearling steers on pasture, seven head of steers which had been carried through the winter in the ordinary way, and were not in high flesh, were turned out on pasture on May 26, after having been carefully weighed. They were brought in from pasture on October 30. The cost of 1 pound of gain on pasture, with the pasture valued at $1 per head per month, is 3·72 cents for the average of this lot. Information is desired as to the average number of cattle that may be carried on pasture, both native and cultivated grasses. When information of this kind is available from figures covering a number of years' work, it will be possible to state the value of land for pasture purposes. The tables submitted herewith give further details with regard to this test:—

Cost of Pasturing Seven Steers.

First gross weight, May 26, 1914	Lb.	3,940
First average weight, May 26, 1914	"	562·85
Gross weight, October 30, 1914	"	4,880
Average weight, October 30, 1914	"	697·14
Total gain on pasture (5 months)	"	940
Average gain on pasture (5 months)	"	134·29
Daily gain on pasture (5 months)	"	·88
Gain per steer per month	"	26·85
Total cost of pasture	$	35 00
Value of gain at 5 cents per pound	"	6 71
Return value for pasture per month	"	1 34
Cost per pound gain on pasture	Cents.	3·72

FEEDING FOR BEEF.

Sixty steers were fed for beef during the winter of 1914-15. They were nearly all 3-year-olds, but there were a few 2-year-old cattle in the group. The experiments were started on November 25, when the cattle were divided into groups, and feeding was commenced with the object of comparing gains made by cattle on the same feed in the barn *versus* in the corral *versus* in the bush without shelter other than the bluff itself.

There were fifty steers included in this portion of the experiment in which various forms of shelter were compared—ten in the barn and twenty each in the corral and bush. The comparison of the food value of different rough fodders was made, using ten other steers in the barn. These were check-fed against ten on prairie hay, and were divided as follows: Six on green sheaves, two on timothy hay, and two on ensilage and straw. The group of two on ensilage and straw did not show any particularly high food values for this combination of bulky fodders, but it should be explained that this group of steers was too small to ensure very reliable results, particularly when one of the individuals in the group developed a very nervous disposition when confined in the barn. For this reason the figures in this particular group are not considered very reliable; they indicate, however, the marked superiority of ensilage and straw over timothy hay.

The feeding of grain was commenced on January 1, when a mixture composed of one part of ground oats to two parts of ground barley was fed, starting at the rate of 3 pounds per head per day. This ration was gradually increased until 8 pounds per steer per day was being fed. Because of the fact that the cattle seemed to be making very good gains on this quantity of grain, and also because of the relatively high price of grain during the past winter, the amount of the grain ration was not increased beyond 8 pounds per head per day. The steers in all groups were fed a similar grain ration, both in quality and amount.

The steers were given all the salt they would eat, and those in the barn had water before them at all times. The steers in the corral were watered twice daily at a large tank outside, in which a tank heater was placed and sufficient fire kept therein to prevent ice from forming. The steers in the bush were watered through the ice at a large slough.

This test is the third of a similar nature carried on at this Station, and it is safe to draw certain conclusions with regard to the character of shelter with which feeders would be justified in providing their cattle. The results two years out of three have been decidedly in favour of feeding outside in the corral. The results during the third season rather indicated an advantage in inside feeding, though not sufficient to cover the charges that would necessarily be made against the cattle feeding inside in order to cover interest on investment in buildings, and depreciation of same. Again, at the time the cattle were weighed in 1913, when those fed inside appeared to have the advantage, the temperatures were extremely low and thus cattle outside were not drinking to the same extent as those in the barns, which had free access to water under favourable conditions, consequently the shrinkage would be greater on the cattle fed inside. In 1914, the cattle at the time they were weighed were equally well filled and the shrinkage of all groups was practically equal. Of car weights, the cattle dressed an average of 59·99 per cent.

We believe that no feeder would be justified in erecting buildings in which to carry on his feeding operations. A corral with a 6- or 7-foot close board fence to break the wind, and with a fair amount of room for the number of cattle being fed, will prove satisfactory. In addition to the close board fence and a fair amount of elbow room, the corral should be kept well bedded. If this sort of shelter is available, together with plenty of hay or green feed and a moderate amount of grain, regularly fed, with an unlimited amount of salt and water, the feeder will provide a set of conditions which will put liberal gains on any bunch of well-bred cattle.

The following table gives in detail the results of the trial concluded March 3, 1915. Since the feed fed in 1915 was purchased, the purchase price has been charged against the cattle this year. These prices are: $5 per ton for prairie hay; 56 cents per bushel for barley; and 40 cents per bushel for oats.

When the cattle intended for feeding were shipped into Lacombe, almost one-half of the number in two cars had been dehorned previously, while the remainder still carried the ornaments that nature provides in the shape of horns. All cattle shipped

and turned into strange pastures will show shrinkage, but an experiment was undertaken to determine the effect of dehorning on the amount of shrinkage. The following figures show that the steers which were dehorned on arrival shrank 23·7 pounds per head, in one week, more than those which had been previously dehorned.

From these figures it would appear to be good business to dehorn cattle as calves by the use of caustic potash, or to dehorn as yearlings when the check will not be so great.

	Horned.	Dehorned.
	Lb.	Lb.
First weight, October 31, 1914	32,974	27,005
Average weight, October 31, 1914	1,176·6	1,174·1
Gross weight, November 7, 1914	31,325	26,195
Average weight, November 7, 1914	1,118·7	1,139·0
Total loss	1,649·0	810·0
Average loss	58·9	35·2

Steer Feeding Experiment.—Dominion Experimental Station, Lacombe, 1914-15.

		Group 1. Green feed. Inside.	Group 2. Timothy hay. Inside.	Group 3. Ensilage and straw. Inside.	Group 4. Prairie hay. Outside.	Group 5. In corral. Inside.	Group 6. In bush. Outside.
Number of steers in lot		6	2	2	10	20	20
First weight, November 25, 1914	lb.	7,100	2,370	2,475	11,700	23,278	23,625
First average weight	"	1,183	1,185	1,237	1,170	1,163	1,181
Finished weight	"	7,980	2,540	2,680	12,690	27,430	26,590
Finished average weight	"	1,330	1,270	1,340	1,269	1,371	1,329
Total gain in 97 days	"	880	170	205	990	4,152	2,965
Average daily gain per steer	"	1·51	0·87	1·055	0·99	2·14	1·52
Amount of meal eaten	"	2,598	866	866	4,060	8,660	8,660
Amount of hay eaten	"	....	3,840	8,015	29,030	58,450	66,290
Amount of green feed eaten	"	9,328	....	....	....	....	....
Amount of straw eaten	"	....	....	3,765	....	....	....
Gross cost of feed	$	77 04	29 33	25 91	120 07	247 44	267 04
Average cost of feed per steer	$	12 84	14 66	12 95	12 00	12 37	13 35
Cost of cattle	$	437 83	146 15	152 62	721 50	1,435 64	1,456 87
Average value of steers at start	$	72 97	73 07	76 31	72 15	71 78	72 84
Cost of 100 pounds gain	$	8 75	17 25	12 98	12 12	5 93	9 00
Return from cattle at $7.10, less 5 per cent. shrinkage, less half of 1 per cent. insurance	$	535 57	170 48	179 87	851 67	1,840 91	1,784 54
Average selling price per steer	$	89 26	85 24	89 93	85 16	92 05	89 23
Average increase in value	$	16 29	12 17	13 62	13 01	20 28	16 39
Profit on group	$	20 70	−5 00	1 34	10 10	157 83	60 63
Profit per head	$	3 45	−2 50	0 67	1 01	7 90	3 03

Lacombe.

DAIRY CATTLE

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN, E. S. ARCHIBALD, B.A., B.S.A.

DAIRY CATTLE.

There are in all 158 head of cattle in the barns, comprising 116 head of pure-breds and 42 head of grade milch cows and heifers. All dairy cattle are kept for experimental breeding and feeding work.

PURE-BRED BREEDING CATTLE.

Ayrshires.. 30,	including	13	milch cows,	12	heifers,	5	bulls.
Canadians.. 22,	"	10	"	7	"	5	"
Guernseys.. 23,	"	10	"	10	"	3	"
Holsteins.. 25,	"	10	"	11	"	4	"
Jerseys.. 16,	"	9	"	3	"	4	"

GRADE HERDS.

Grade Ayrshires.. 17,	including	11	milch cows,	4	heifers,	2	steers.
Grade Holsteins.. 25,	"	14	"	7	"	4	"

HOLSTEINS.

The Holstein herd is still headed by the splendid 2-year-old bull "King of the Ormsbys," No. 14959. The junior herd bull, "Sir Johanna Ormsby of Hickory," a yearling bull of rare individuality and exceptionally good breeding, is an excellent addition to this herd.

AYRSHIRES.

The Ayrshire herd continues to show marked improvement. This herd is now headed by the yearling bull "Burnside Masterpiece," a youngster of marked individuality and with a record, both for production and trueness to type, without an equal for his age in Canada.

GUERNSEYS.

The Guernsey herd has remained practically unchanged since last reported, except for a normal increase in numbers.

FRENCH CANADIANS.

The French-Canadian herd also remains practically unchanged. This herd is headed by the excellent 3-year-old bull "Ottawa Zouave," No. 2864. A junior herd sire "Delphis de Cap Rouge," No. 3283, is a very valuable addition.

JERSEYS.

The Jersey herd, established in the year 1911, has shown very marked improvement, especially during the past fiscal year. Two heifers, 3 and 4 years of age respectively, have made exceptionally good records, with the most ordinary care and under the most

trying circumstances. Both of these heifers freshened just previous to the loss of the buildings by fire, in October, 1913, and received the best treatment possible, but, under existing conditions, not of the kind which promised to stimulate high records. Special attention is drawn to the records of these heifers.

SALES OF BREEDING STOCK.

Again, I have to report the sales of many excellent young bulls, which have been widely distributed, at reasonable figures, amongst farmers and agricultural societies. These will undoubtedly be heard from, both as good sires and as representative examples of the breed.

SUMMER FEEDING.

The year 1914-15 has been most unsatisfactory for pasture. The spring opened with very little moisture in the ground to stimulate the pastures, and the extremely dry months of April, May, June, and the first half of July caused not only a shortage of the pasture crops but also of hay and other forage crops. The rains of the fall made fairly good late pasture, but, generally speaking, the shortage of pasture has been the most severe in the history of this Farm.

Attention is drawn to the fact that the cost of feeding dairy cattle during the past fiscal year was very much higher than it has ever been in the past. This is due to the fact that, owing to the loss of our feeds by fire, much of the roughages and the grains and meals were purchased, at high prices, on the open market. Again, the corn ensilage, which is the basis of economic dairy husbandry in this part of Canada, was largely lost or wasted, due to the destruction of the silos; hence a much greater amount of meal was necessary in order to grow the young stock and prepare the cows and heifers for their lactation periods. As great economy as possible was practised with cows in milk, but none of the young stock suffered for lack of feed.

Owing to the loss of a large part of the ensilage by fire, and due to the fact that the rest of the ensilage had to be consumed in order to make any use of the same before it spoiled, there was no reserve of this valuable feed for the month of August.

WINTER FEEDING.

The winter feeding was conducted under more favourable conditions than a year ago, as the new buildings had been completed. Unfortunately, the quantity of some of the roughages was not as great as usual, owing to the extremely dry season; and the crop of hay and roots was so much below an average year in amount, that the cattle did not have the usual supply. The great salvation of the winter feeding was the large quantity of splendid ensilage which had been stored.

The aged cattle entered the barns in the fall in fair flesh, and did very well during the winter months. The yearling heifers, on the limited pasture available, did poorly during the summer months, and entered the barn in low condition. However, during the winter, these have regained their former condition and have thrived well.

The winter ration per day for milch cows was, on the average, about as follows:—

	Pounds.
Hay	5
Corn ensilage	25
Roots	10
Straw	5
Meal	7

The meal consisted of a mixture of 400 pounds of bran, 200 pounds of gluten feed; 200 pounds of ground corn, 100 pounds of linseed oil cake meal, and 200 pounds of cottonseed meal.

OTTAWA.

The hay produced on the Farm was variable in character, some being extra choice clover hay, and smaller quantities being low grade grass hay. The hay purchased to make up the shortage was of fairly good quality for the feeding of dairy cattle, especially one lot of alfalfa hay, which was the most economical hay fed during the winter. The corn ensilage was of splendid quality, rich in grain, and well preserved in the new silos. The roots were very short in quantity but of excellent quality. These were pulped and fed mixed with the corn ensilage and cut straw, excepting in the feeding experiments elsewhere reported.

The better facilities supplied in the new barn allowed the cutting of the straw at the time of threshing and blowing it into an upper loft, from which chutes extended to the feed room. The straw thus prepared for feeding was of excellent quality, and saved many tons of hay.

The meal was scattered on the ensilage after it was before the cattle. The hay was given uncut, after the other materials had been cleaned up.

Generally speaking, the milch cows were allowed all the roughage they would consume. As in former years, the meal was given in proportion to the milk produced, usually at the rate of 1 pound for every 4 or 4½ pounds of milk produced. This ratio between the meal and the milk was naturally varied to suit the requirements of each individual, as well as to suit the richness and palatability of the coarse forage.

Water was before the cows at all times. The salt was added to the roughage at the time of mixing. The same conveniences were also installed in the calf barn, and, although in the very cold weather the calves did not consume a great quantity of water, yet they apparently appreciated having this at their disposal.

ELEVATOR SCREENINGS FOR DAIRY CATTLE.

In the fall of 1914, at the request of the Seed Branch, an investigation was started with the grade herd to ascertain facts regarding the value of elevator by-products as a food for dairy cattle. These elevator by-products or screenings were supplied by the Seed Branch from certain Fort William elevators, and graded as follows:—

1. Pulverized complete screenings.
2. Pulverized blackseed.

ANALYSIS OF ELEVATOR SCREENINGS.

The following botanical analyses were supplied by the seed commissioner.

A composite sample of 6,000 tons of elevator screenings gave the following separations:—

37	Per cent	scalpings.
7	"	succotash flax.
18	"	buckwheat screenings.
38	"	blackseeds.

Scalpings.—65 per cent wheat; 25 per cent other grains; 3 per cent weed seeds; 7 per cent straw and chaff. Considered excellent feed—no immediate need to investigate its value.

Succotash Flax.—30 per cent flax; 40 per cent broken wheat; 15 per cent weed seeds, chiefly wild buckwheat, lamb's quarters, and wild oats; 15 per cent chaff.

Buckwheat Screenings.—58 per cent wild buckwheat; 29 per cent broken wheat, oats, and flax; 9 per cent weed seeds; 4 per cent chaff.

Blackseeds.—Before analyzing this material a separation was made of it by means of the 1/25-inch perforated zinc sieve.

The 38 per cent blackseeds was thus separated into 7 per cent which passed through the $\frac{1}{25}$-inch sieve, and 31 per cent above it.

Of the portion passing through the $\frac{1}{25}$-inch sieve, 22 per cent was tumbling mustard, 63 per cent dust, 10 per cent lamb's quarters, and 5 per cent other weed seeds.

Of the portion passing over the $\frac{1}{25}$-inch screen, 53 per cent was lamb's quarters, 3 per cent wild mustard, 8 per cent other mustard, 9 per cent other weed seeds, and 27 per cent chaff.

The above mentioned work, which took the form of a series of co-related experiments, may best be outlined briefly under the following headings:—

Object of experiment.—To compare a good grain ration with elevator screenings, blackseeds, and with these two supplemented by Molasses Meal in order to increase palatability.

Plan of Experiment.—Each of the following experiments was conducted in three periods of two weeks each, the necessary calculations being made from data collected during the second week of each period. The first week allowed the cows to become accustomed to any change in ration. By averaging the results of the first and third periods a fair comparison with the intermediate period is possible.

Exp. I.—Period I—Regular meal mixture.
Period II—Regular meal mixture, 2 parts; elevator screenings, 1 part.
Period III—Regular meal mixture.

Exp. II.—Period I—Regular meal mixture.
Period II—Regular meal mixture, 2 parts; pulverized blackseed, 1 part.
Period III—Regular meal mixture.

Exp. III.—Period I—Regular meal mixture.
Period II—Regular meal mixture, 2 parts; elevator screenings, 2 parts; Caldwell's molasses meal, 2 parts.
Period III—Regular meal mixture.

Exp. IV.—Period I—Regular meal mixture.
Period II—Regular meal mixture, 4 parts; Caldwell's molasses meal, 2 parts.
Period III—Regular meal mixture.

Meal Mixture.—Bran, 4 parts; gluten feed, 2 parts; corn meal, 2 parts; oil cake, 1 part; cottonseed, 1 part.

Value of Feeds per Ton.—Hay, \$7; roots and ensilage, \$2; complete pulverized screenings, \$10; blackseed, \$4; Caldwell's molasses meal, \$34.50; regular meal, 1·3 cent per pound.

Plan of Feeding.—All cows received the same quantity per cow of roughage; that is, hay, roots, and ensilage.

All cows received grain in the proportion of 1 pound grain for every 4 pounds milk produced. Where the grain ration was rendered unpalatable by the addition of the elevator by-products, causing several of the cows to refuse portions of the ration, such parts were weighed and credited to the cow.

TABLE No. 1.—Dairy Cow Feeding Experiment No. 1—Meal *versus* Meal, 2 parts; complete Pulverized Screenings, 1 part.

Feeds.		Meal — Period 1	Meal — Period 3	Meal — Average Periods 1 and 3	Meal and Screenings. — Period 2
Number of cows in test		16	16	16	16
Pounds of milk, produced by sixteen cows	lb.	2,732·5	2,088	2,410·5	2,450·5
Average milk per cow per day	"	24·4	18·7	21·5	21·9
Average per cent fat in milk	p.c.	3·9	3·95	3·93	3·95
Total pounds fat produced by sixteen cows	lb.	106·6	82·5	94·6	96·77
Average pounds fat per cow per day	"	·951	·739	·845	·864
Total meal consumed	"	1,036	1,036	1,036	936
Total hay consumed	"	672	672	672	672
Total molasses consumed	"	......	......	......	......
Total roots consumed	"	......	......	......	......
Total ensilage consumed	"	3,990	3,990	3,990	3,990
Mixture consumed per 100 pounds fat produced	"	971·8	1,255·7	1,095	967·8
Relative value for production of fat	p.c.	......	......	100	113·6
Mixture consumed per 100 pounds milk produced	lb.	37·9	49·6	43	38·2
Relative value for production of milk	p.c.	......	......	100	112·5
Findings from Experiment—					
Cost of meal mixture fed	$	13·46	13·46	13·46	9·67
Value of roughage fed	$	6·34	6·34	6·34	6·34
Total cost of feed	$	19·80	19·80	19·80	16·01
Cost to produce 100 pounds fat	$	18·57	24·00	20·93	16·55
Cost to produce 1 pound fat		·185	·24	·209	·165
Cost to produce 1 pound butter	$	·155	·20	·175	·138
Profit on 1 pound butter at 30 cents a pound	$	·145	·10	·125	·162
Cost to produce 100 pounds milk	$	·721	·95	·82	·662
Profit on 100 pounds milk at $1.70 per hundredweight	$	·979	·75	·88	1·04
Total weight of cows for period	lb.	16,089	16,792	......	16,387
Gain for period	"	....	405	......	298

That the ration fed during period II was unpalatable to a marked degree was shown by the fact that even during its second week, when the cows had become more or less accustomed to the change, over 100 pounds was removed and credited to the animals. Notwithstanding this, however, the production of milk during period II was greater than the average of production of periods I and III. Referring to the findings from the experiment, the cost of the elevator screenings ration is, on the values adopted, considerably lower than the meal ration alone. Taking into consideration the lessened amount of meal consumed, this would explain the relatively low cost of production. In this experiment, 312 pounds of screenings replaced 420 pounds of regular meal mixture, or at the valuation of $26 for the latter, the complete pulverized screenings fed as one-third of the grain ration acquired a value of $34 per ton. It must be remembered that this deduction, while correct, is made from the results of an experiment of very short duration, as will be discussed more fully.

TABLE No. 2.—Dairy Cow Feeding Experiment No. 2—Meal *versus* Meal, 2 parts; Pulverized Blackseeds, 1 part.

Feeds		Meal — Period 1	Meal — Period 3	Meal — Average Periods 1 and 3	Meal and Pulverized Blackseeds. — Period 2
Number of cows in test		15	15	15	15
Pounds of milk produced by fifteen cows	lb.	2,227·5	2,293·5	2,260·5	2,080
Average milk per cow per day	"	21·3	21·8	21·5	19·8
Average per cent fat in milk	p.c.	3·9	3·6	3·75	3·6
Total pounds fat produced by fifteen cows	lb.	86·8	82·5	84·8	74·9
Average pounds fat per cow per day	"	·826	·785	·807	·713
Total meal consumed	"	998	998	998	868
Total hay consumed	"	630	630	630	630
Total molasses consumed	"	......	......	......	......
Total roots consumed	"	1,260	1,260	1,260	1,260
Total ensilage consumed	"	2,240	2,240	2,240	2,240
Mixture consumed per 100 pounds fat produced	"	1,149	1,209	1,177	1,159
Relative value for production of fat	p.c.	......	......	100	101·5
Mixture consumed per 100 pounds milk, produced	lb.	44·8	43·5	44·6	41·7
Relative value for production of milk	p.c.	......	......	100	106·9
Findings from Experiment—					
Cost of meal mixture fed	$	12·97	12·97	12·97	8·10
Value of roughage fed	$	5·71	5·71	5·71	5·71
Total cost of feed	$	18·68	18·68	18·68	13·81
Cost to produce 100 pounds fat	$	21·52	22·64	22·03	18·44
Cost to produce 1 pound fat	$	·215	·226	·22	·184
Cost to produce 1 pound butter	$	·18	·189	·184	·154
Profit on 1 pound butter at 30 cents per pound	$	·12	·111	·116	·146
Cost to produce 100 pounds milk	$	·83	·81	·827	·664
Profit on 100 pounds milk at $1.70 per hundredweight	$	·87	·89	·873	1·036
Total weight of cows for period	lb.	15,670	16,390	......	16,052
Gain for period	"	......	338	......	382

The ration fed during the three periods, the results of which are given in the foregoing table, was even more unpalatable than that fed during experiment I, ground blackseeds having an extremely bitter flavour and being of a fine, dusty nature. One hundred and thirty pounds of the mixture were removed. The production during period II was considerably less than that of the average of periods I and III; nevertheless, with one-third of the meal ration valued at the rate of $4 per ton, and with the lessened amount of meal consumed, the cost of production in the case of the blackseed ration is relatively low. As will be shown in greater detail, the complete elimination of one-third of the ration might have resulted in still lower cost of production for this short space of time. Nevertheless, from the actual data given, the following figures may be deduced: 366 pounds blackseeds, 60 pounds hay, 126 pounds roots, and 224 pounds ensilage would be equivalent to 267 pounds meal mixture, for milk production. On the given valuations for regular feeds, blackseeds acquire a valuation of $16 per ton for milk production.

TABLE No. 3.—Dairy Cow Feeding Experiment No. 3—Meal *versus* Equal Parts of Meal, Complete Pulverized Screenings, and Caldwell's Molasses Meal.

Feeds		Meal — Period 1	Meal — Period 3	Meal — Average of Periods 1 and 3	Scr.-1 pt. Meal—1 pt. Mol. Meal—1 pt. — Period 2
Number of cows in test		16	16	16	16
Pounds of milk, produced by sixteen cows	lb.	2,654	2,604	2,629	2,476
Average milk per cow per day	"	23·7	23·2	23·4	22·1
Average per cent fat in milk	p.c.	3·7	3·7	3·7	3·7
Total pounds fat produced by sixteen cows	lb.	98·2	96·4	97·27	91·61
Average pounds fat per cow per day	"	·876	·848	·865	·817
Total meal consumed	"	1,092	1,092	1,092	992
Total hay consumed	"	672	672	672	672
Total molasses meal consumed	"	......	......	......	231
Total roots consumed	"	1,435	1,435	1,435	1,435
Total ensilage consumed	"	2,555	2,555	2,555	2,555
Mixture consumed per 100 pounds of fat produced	"	1,112	1,132	1,122	1,082
Relative value for production of fat	p.c.	......	......	100	1,037
Mixture consumed per 100 pounds of milk, produced	lb.	41·1	41·9	41·5	40·
Relative value for production of milk	p.c.	......	......	100	104·
Findings from Experiment—					
Cost of meal mixture fed	$	14·19	14·19	14·19	11·57
Value of roughage fed	$	6·34	6·34	6·34	6·34
Total cost of feed	$	20·53	20·53	20·53	17·91
Cost to produce 100 pounds fat	$	20·90	21·29	21·12	19·55
Cost to produce 1 pound fat	$	·20	·21	·21	·19
Cost to produce 1 pound butter	$	·16	·17	·17	·15
Profit on 1 pound butter at 30 cents per pound	$	·14	·13	·13	·15
Cost to produce 100 pounds milk	$	·769	·788	·778	·72
Profit on 100 pounds milk at $1.70 per hundredweight	$	·931	·912	·922	·98
Total weight of cows for period	lb.	17,508	18,026	......	17,749
Gain in weight	"	......	277	......	241

As will be seen, the above results do not indicate any particular increase in the palatability of the meal ration due to the addition of molasses meal. One hundred pounds of the mixture was removed from the cows and credited to them. Even with the lower production in period 2, and after having valued molasses meal at $34.50, the cost to produce with the screenings ration is appreciably lower.

Keeping in view the limitations of this test, the following deduction is possible: A mixture of equal parts of Caldwell's molasses meal and pulverized complete screenings replaced about the same quantity of the regular meal mixture for milk production, and is worth about $25 per ton.

TABLE No. 4.—Dairy Cow Feeding Experiment No. 4—Meal *versus* Meal, 4 parts; Caldwell's Molasses Meal, 1 part.

Feeds		Meal — Period 1	Meal — Period 3	Meal — Average of Periods 1 and 3	Meal–4 pts. Caldwell's Molasses Meal–1 pt. — Period 2
Number of cows in test		14	14	14	14
Pounds of mil, produced by fourteen cows	lb.	2,443	2,314	2,379	2,308
Average milk per cow per day	"	24·9	23·6	24·3	23·5
Average per cent fat in milk	p.c.	3·8	3·8	3·8	3·8
Total pounds fat produced by fourteen cows	lb.	92·83	87·93	90·40	87·70
Average pounds fat per cow per day	"	·95	·896	·93	·895
Total meal consumed	"	952	952	952	952
Total hay consumed	"	588	588	588	588
Total molasses consumed	"	......	......	......	......
Total roots consumed	"	1,260	1,260	1,260	1,260
Total ensilage consumed	"	2,240	2,240	2,240	2,240
Mixture consumed per 100 pounds fat produced	"	1,025	1,083	1,054	1,085
Relative value for production of fat	p.c.	......	......	100	97
Mixture consumed per 100 pounds milk produced	lb.	38·9	41	40	41·2
Relative value for production of milk	p.c.	......	......	100	96
Findings from Experiment—					
Cost of meal mixture fed	$	12·37	12·37	12·37	13·63
Value of roughage fed	$	5·50	5·50	5·50	5·50
Total cost of feed	$	17·87	17·87	17·87	19·13
Cost to produce 100 pounds fat	$	19·25	20·32	19·76	21·81
Cost to produce 1 pound fat	$	·192	·203	·197	·218
Cost to produce 1 pound butter	$	·161	·17	·165	·183
Profit on 1 pound butter at 30 cents per pound	$	·139	·13	·135	·117
Cost to produce 100 pounds milk	$	·731	·771	·75	·829
Profit on 100 pounds milk at $1.70 per hundredweight	$	·969	·929	·95	·871
Total weight of cows for period	lb.	15,708	15,883	......	15,613
Gain or loss in weight	"	......	(270 gain)	......	(85 loss)

The foregoing concluding table of this experiment is interesting for two reasons: first, because it corroborates results obtained previously in 1914 and already reported, to the effect that molasses meals are an expensive food and the use of same in a well-balanced and already palatable ration is doubtful; second, because of the very slight increase in production which it induced in comparison with corresponding periods in the previous three tables and out of all proportion to the increased cost.

In this experiment, 298 pounds of meal mixture is equal to 327 pounds of Caldwell's molasses meal, 20 pounds of hay, 37 pounds of roots, and 67 pounds of ensilage. At the given valuations of the regular feeds, Caldwell's molasses meal has a valuation of only about $22.50 per ton.

GENERAL CONCLUSIONS FROM FOUR EXPERIMENTS.

Lest too hasty deductions be made from the results given, there are several points to consider in the feeding of elevator screenings. Judging from these experiments, such material has a fair feeding value. Only in one experiment (experiment No. 1), however, did the by-product period show any increase over the average of the first and third periods, which in this instance was due to a heavy and rather unaccountable fall-

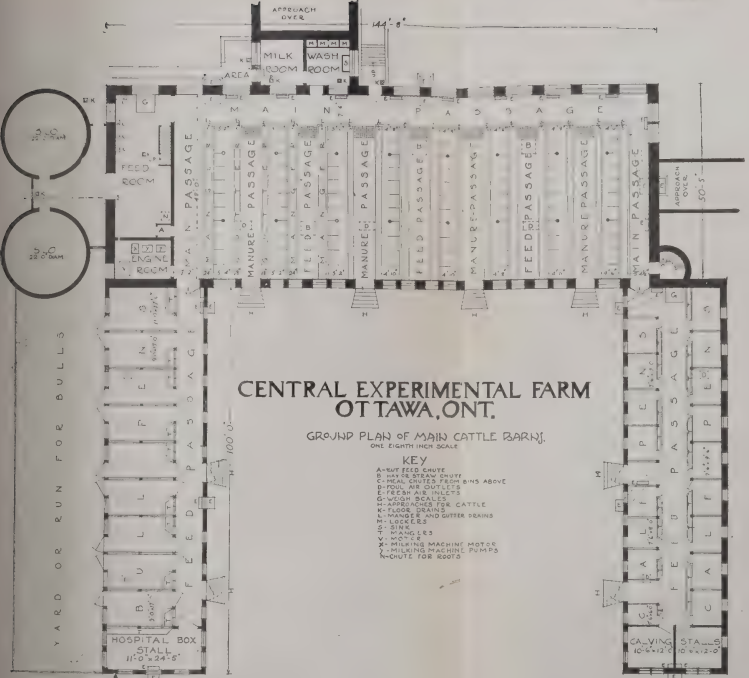

CENTRAL EXPERIMENTAL FARM
OTTAWA, ONT.
GROUND PLAN OF MAIN CATTLE BARNS.
ONE EIGHTH INCH SCALE
KEY
A-CUT FEED CHUTE
B HAY OR STRAW CHUTE
C-MEAL CHUTES FROM BINS ABOVE
D-FOUL AIR OUTLETS
E-FRESH AIR INLETS
G-WEIGH SCALES
H-APPROACHES FOR CATTLE
K-FLOOR DRAINS
L-MANGER AND GUTTER DRAINS
M-LOCKERS
S-SINK
T MANGLES
V-MOTOR
X-MILKING MACHINE MOTOR
Y-MILKING MACHINE PUMPS
N-CHUTE FOR ROOTS
APPROACH OVER
MILK ROOM
WASH ROOM
AREA
144'-8"
MAIN PASSAGE
FEED ROOM
ENGINE ROOM
MANURE PASSAGE
FEED PASSAGE
MANURE PASSAGE
FEED PASSAGE
MANURE PASSAGE
FEED PASSAGE
MANURE PASSAGE
MAIN PASSAGE
APPROACH OVER
50'-5"
YARD OR RUN FOR BULLS
BULL PENS
FEED PASSAGE
100'-0"
HOSPITAL BOX STALL
11'-0"x24'-5"
CALF PENS
FEED PASSAGE
CALF PENS
CALVING STALLS
10'-6"x12'-0"
10'-6"x12'-0"

PLATE XIX

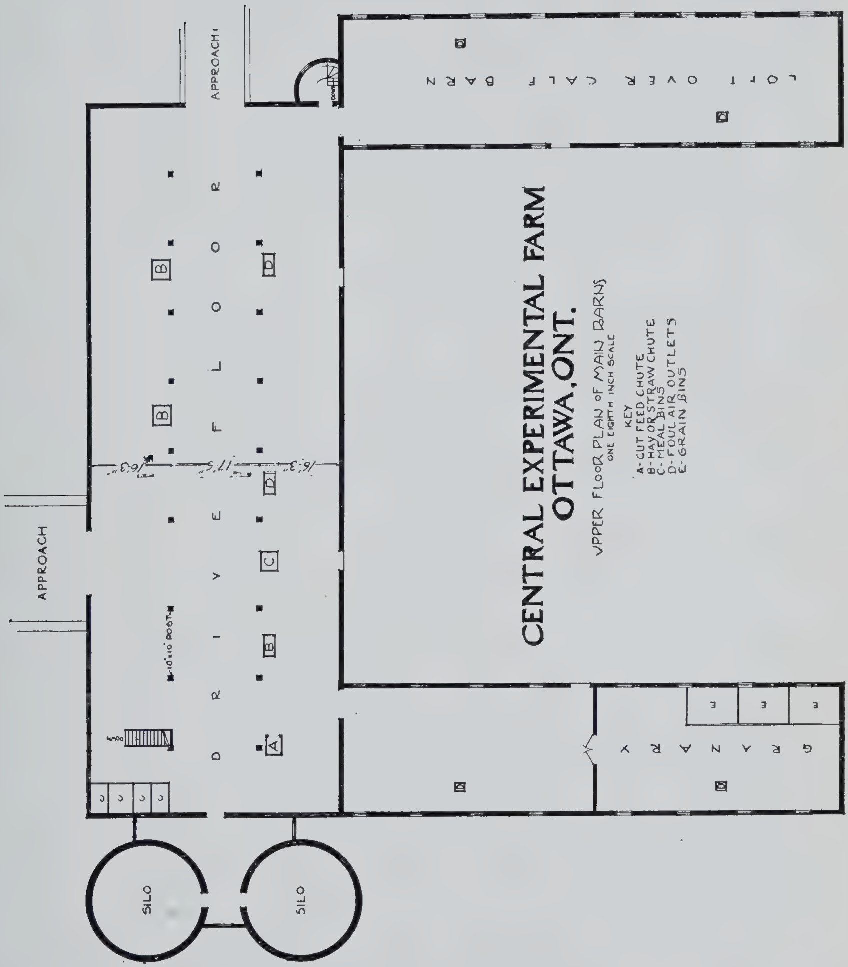
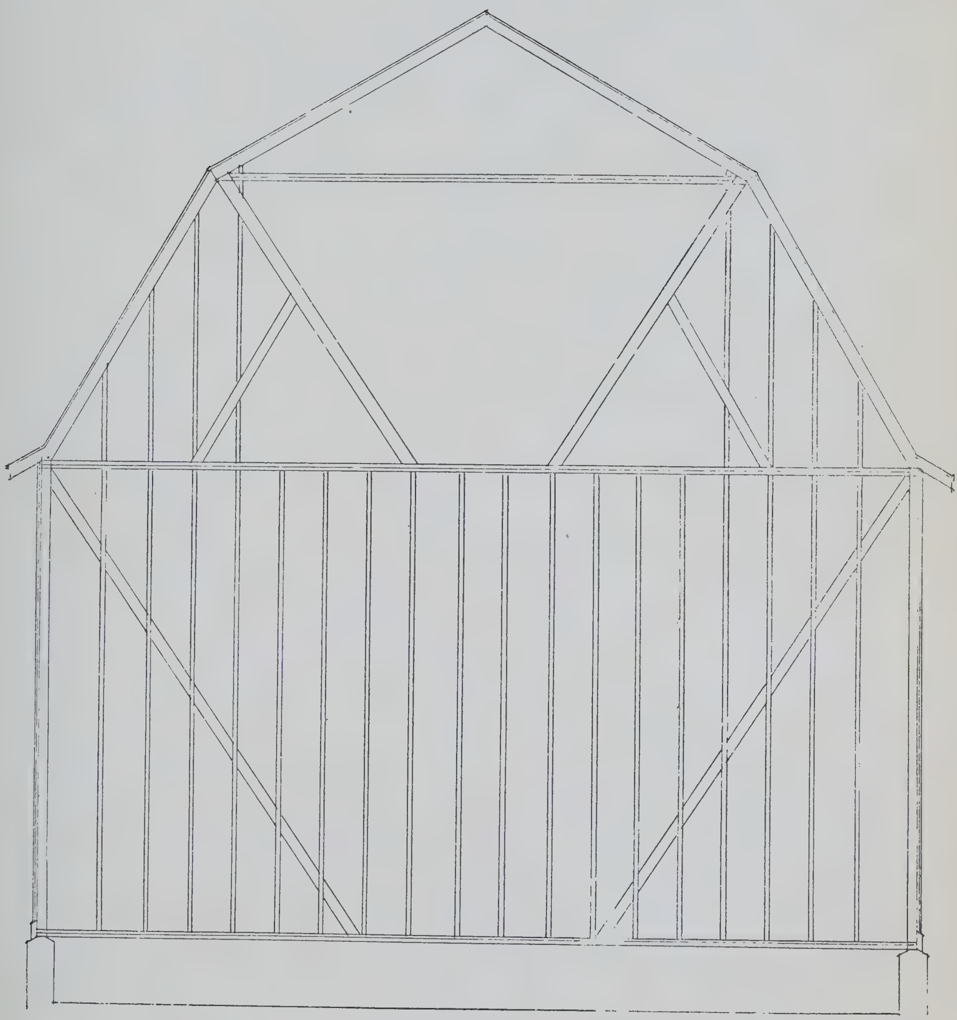

CENTRAL EXPERIMENTAL FARM
OTTAWA, ONT.
UPPER FLOOR PLAN OF MAIN BARNS
ONE EIGHTH INCH SCALE
KEY
A-CUT FEED CHUTE
B-HAY OR STRAW CHUTE
C-MEAL BINS
D-FOUL AIR OUTLETS
E-GRAIN BINS
DRIVE FLOOR
APPROACH
APPROACH
LOFT OVER CALF BARN
GRANARY
SILO
SILO
10"x10" POST
16'3"
17'5"
16'3"

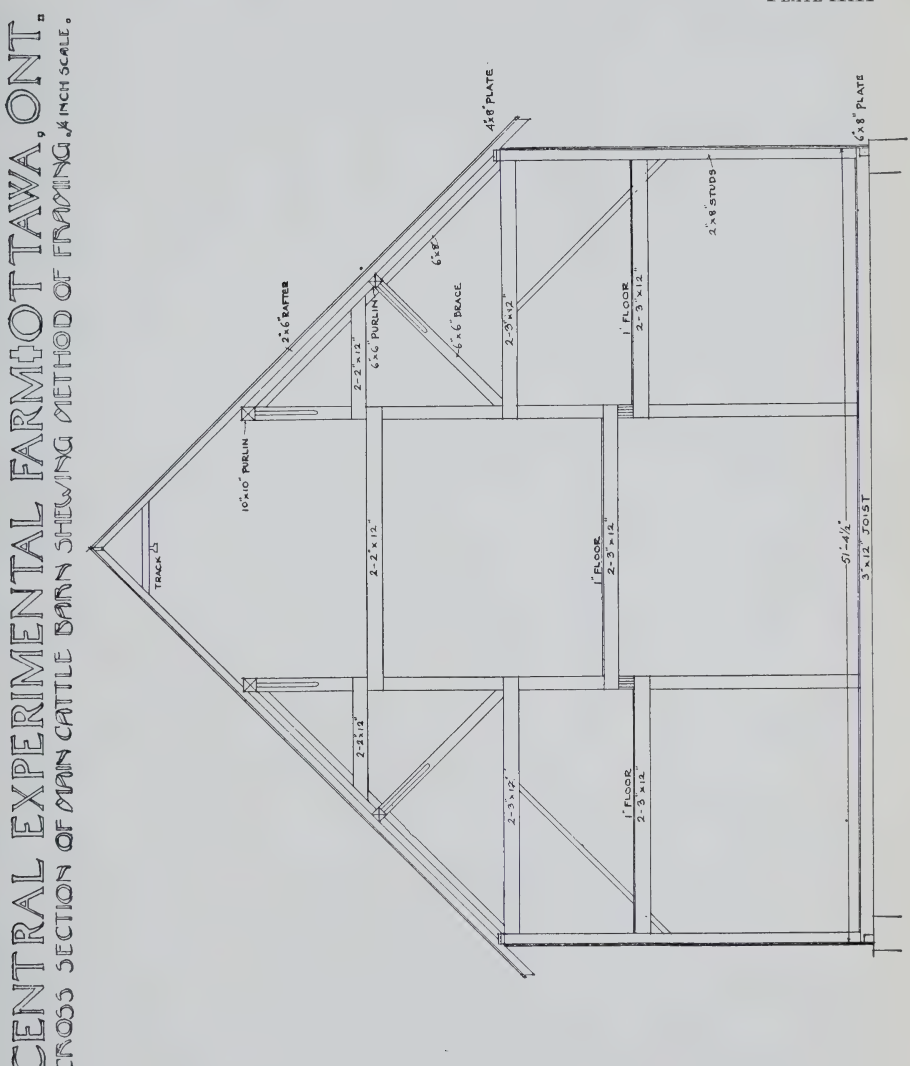
PLATE XX



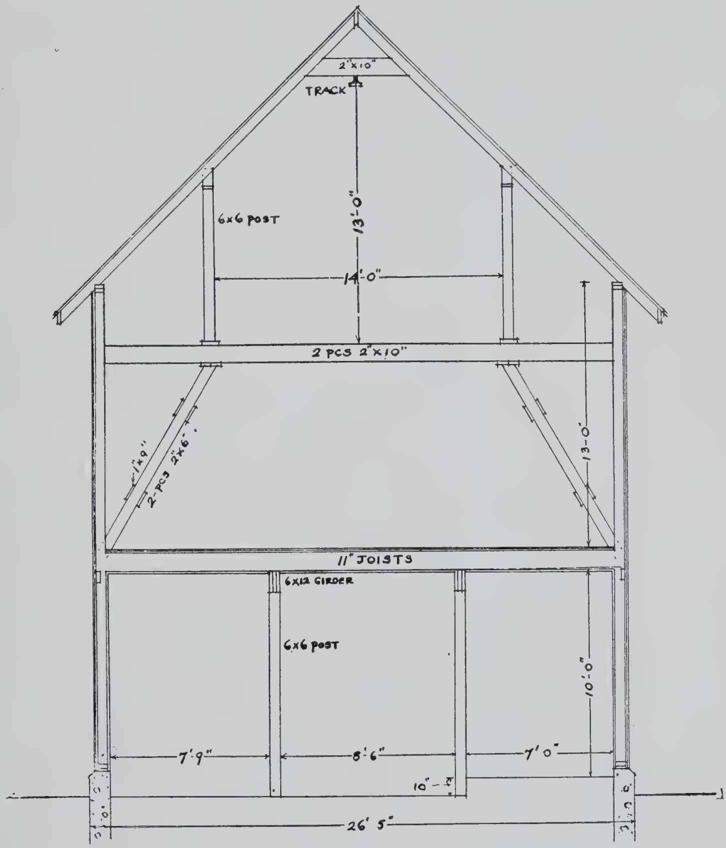
FRAMING OF END BENT.

15—1916—25b½

PLATE XXI


CENTRAL EXPERIMENTAL FARM OTTAWA, ONT.
CROSS SECTION OF MAIN CATTLE BARN SHEWING METHOD OF FRAMING, ¼ INCH SCALE.
TRACK
10"x10" PURLIN
2"x6" RAFTER
6"x6" PURLIN
2-2"x12"
6"x6" BRACE
6"x8"
4"x8" PLATE
2-3"x12"
1" FLOOR
2"x8" STUDS
6"x8" PLATE
51'-4½"
3"x12" JOIST

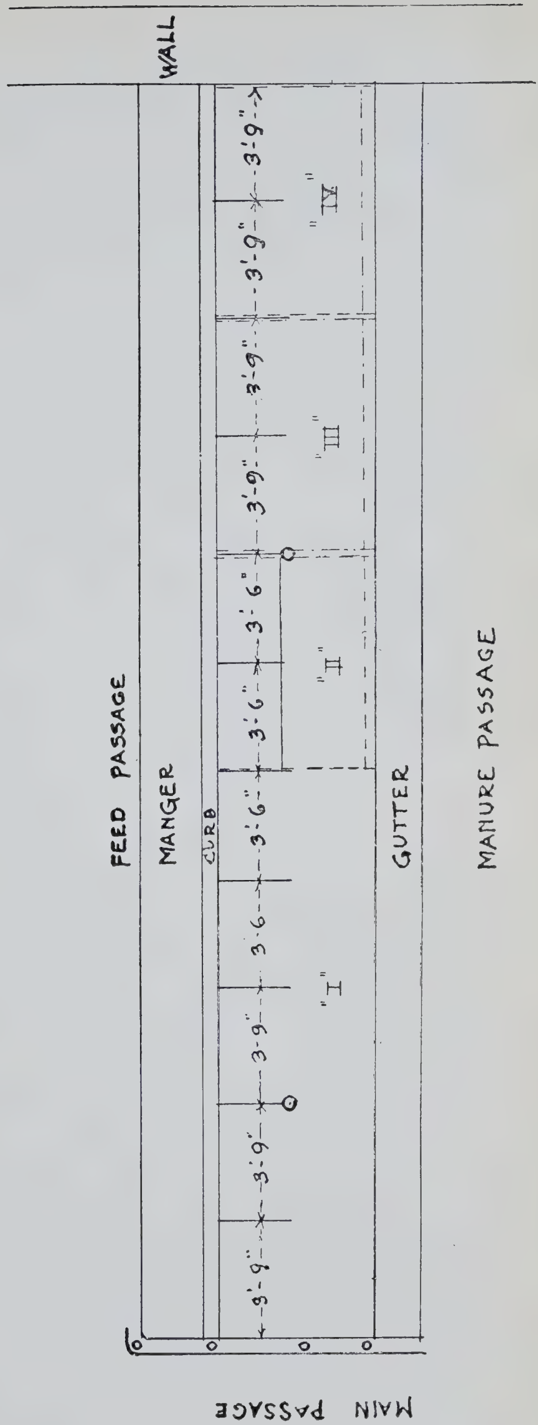
CENTRAL EXPERIMENTAL FARM OTTAWA, ONT.

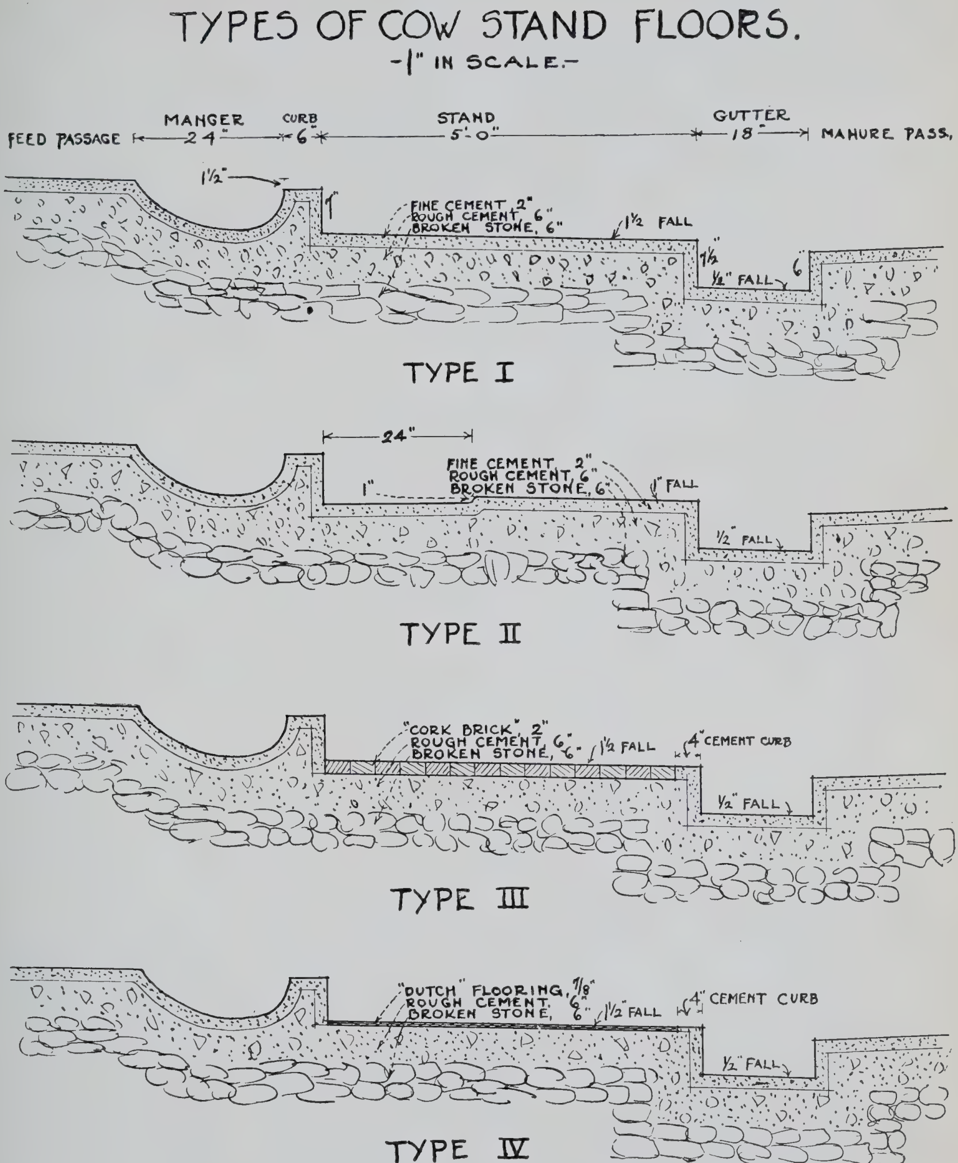


CROSS SECTION OF BULL BARN
SHEWING FRAMING—¼ IN SCALE—

TYPES OF COW STAND FLOORS.

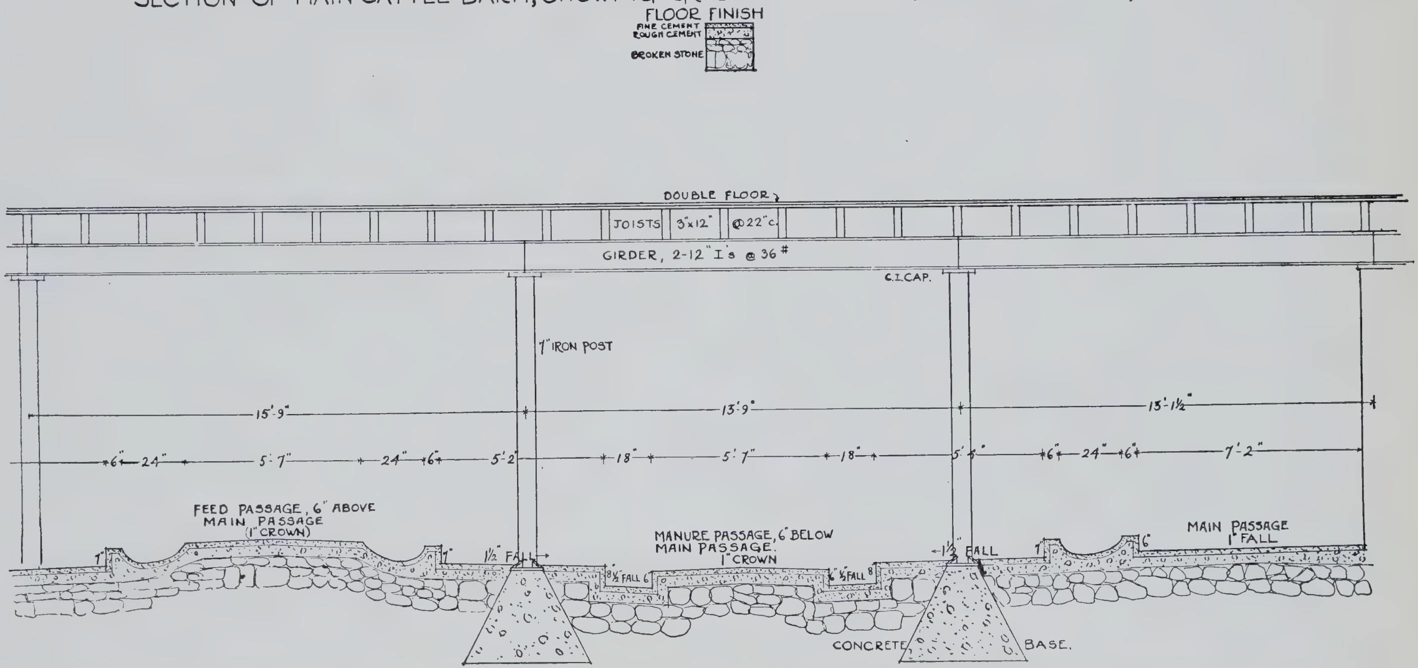
-1/4 IN SCALE-




TYPES OF COW STAND FLOORS.
-1" IN SCALE.-
FEED PASSAGE
MANGER 24"
CURB 6"
STAND 5'-0"
GUTTER 18"
MANURE PASS.
1½"
1"
FINE CEMENT, 2"
ROUGH CEMENT, 6"
BROKEN STONE, 6"
1½ FALL
1½
½" FALL
6
TYPE I
24"
1"
FINE CEMENT, 2"
ROUGH CEMENT, 6"
BROKEN STONE, 6"
1" FALL
½" FALL
TYPE II
"CORK BRICK", 2"
ROUGH CEMENT, 6"
BROKEN STONE, 6"
1½ FALL
4" CEMENT CURB
½" FALL
TYPE III
"DUTCH" FLOORING, 7/8"
ROUGH CEMENT, 6"
BROKEN STONE, 6"
1½" FALL
4" CEMENT CURB
½" FALL
TYPE IV

CENTRAL EXPERIMENTAL FARM—OTTAWA ONT.

SECTION OF MAIN CATTLE BARN, SHOWING GRADES AND LEVELS OF FLOORS ½ IN SCALE



Cattle Barn, Central Experimental Farm, Ottawa. Exterior view showing silos. Homemade cement hollow block to left and "Natco" clay tile silo to right.
(See page 400 for plans of barn.)

ing-off in period 3, perhaps caused by the protracted effects of an unpalatable ration fed for the first time. In the next two comparisons the falling-off in milk flow was quite marked: wholly insufficient, however, to prevent the regular ration from suffering when compared on a cost basis.

It is safe to say that for a period of one or two weeks, one-third of the meal ration fed to a cow in average milk flow might be removed, and provided the animal was consuming a liberal, well-proportioned roughage ration of fair quality, and containing some succulent feed, the milk production during this short period would not be sufficiently decreased to balance the consequent cheapening of the meal ration due to a removal of one-third of the latter. However, one is almost equally safe in stating that the continued feeding of only two-thirds the required, or optimum ration, would show a decrease that could not be balanced by the saving in meal at the end of the year.

That the same would apply to the experiment in question is probable. More than that, considering that certain cows refused all feed, that is, ensilage, roots, cut straw, etc., that came in contact with the meal mixture containing blackseeds and pulverized screenings, it is quite probable that, from the standpoints of both pounds of milk produced and cost to produce, the entire omission of the by-product might have still further increased and cheapened production.

The attitude of the individual cows to the screenings meal rations differed widely. Some showed little preference one for the other; others ate only portions for a few days; others refused it altogether, carefully cleaning up all the roughage with which the meal was fed and leaving practically all of the meal in the manger; others, again, refused throughout the entire period all food containing screenings. With the exception of certain animals that consistently refused the meal ration, however, the herd during the second week of the period, as a rule, consumed it cleanly.

Briefly, it would appear that on these short tests the value of screenings lies not in any palatability that it may add to a ration—not, conclusively, in its power to produce—but rather in its cheapness. Whether the complete pulverized screenings or the apparently undesirable element—blackseeds—cheap though they are, would prove economical on an extended feeding period—whether digestive disturbances or the toxic effects of probable weed seed constituents might present themselves—could not be ascertained within the necessary limits of this test.

Although no test was made of the elevator screenings with blackseeds removed in the experiments just reviewed, the inadvisability of using blackseeds as a food for dairy cows is apparent. Aside from the high percentage of crude fibre, and the actual danger of digestive derangements due to its use, blackseed is not only highly unpalatable itself, but also able to render likewise any ration or mixture of which it becomes a part. Elevator screenings with the blackseeds removed constitute a palatable and cheap foodstuff. From the grain grower's standpoint of economy it would appear advisable to screen all grain before shipment. To obtain the maximum benefit from this material it is further to be advised that its undesirable element be removed and destroyed.

DAIRY COW FEEDING EXPERIMENT No. 5.

TURNIPS *versus* MOLASSES.

In December, 1914, an experiment was conducted with a number of the aged Ayrshire cows, for the purpose of determining, if possible, the value of cane molasses in replacing roots as succulents for milch cows.

Plan of Experiment.—Meal mixture composed as follows was used throughout the experiment: Bran, 4 parts; gluten feed, 2 parts; corn meal, 2 parts; oil cake, 1 part; cottonseed, 2 parts.

Period 1.—Meal, hay, roots, 30 pounds.
Period 2.—Meal, hay, molasses, 4 pounds.
Period 3.—Meal, hay, roots, 30 pounds.

Plan of Feeding.—Each cow was fed 1 pound meal mixture for each 4 pounds of milk produced.

Each cow received what hay she would clean up during the first week of period 1, and approximately the same quantity throughout the rest of the experiment.

Each cow, when being fed roots (turnips), received 30 pounds per day.

Each cow, when being fed molasses, received 4 pounds per day poured on the hay (diluted with hot water when necessary).

Value of Feeds per Ton.—Hay, $7; turnips, $2; molasses, $23; meal, 1·3 cent per pound.

TABLE No. 5.—Dairy Cow Feeding Experiment No. 5.—Turnips *versus* Molasses.

Feeds.		Meal, Hay, Roots. — Period 1.	Meal, Hay, Roots. — Period 3.	Meal, Hay, Roots. — Periods 1 and 3 Average.	Meal, Hay, Molasses. — Period 2.
Number of cows in test		9	9	9	9
Pounds of milk produced by nine cows	lb.	1,625	1,383	1,504	1,485
Average milk per cow per day	"	25·8	22·1	23·9	23·5
Average per cent fat in milk	p.c.	3·9	4·1	4	4
Total pounds fat produced by nine cows	lb.	63·4	56·7	60·1	59·4
Average pounds fat per cow per day	"	1	0·9	0·95	0·94
Total meal consumed	"	546	546	546	546
Total hay consumed	"	630	630	630	630
Total molasses consumed	"	....	....	....	252
Total roots consumed	"	1,890	1,890	1,890	....
Roughage consumed per 100 pounds fat produced	"	3,975	4,445	4,210	1,485
Relative value for production of fat	p.c.	....	....	100	283
Roughage consumed per 100 pounds milk produced	lb.	155	182	168·5	59·4
Relative value for production of milk	p.c.	....	....	100	283
Findings from Experiment—					
Cost of meal mixture fed	$	7·09	7·09	7·09	7·09
Value of roughage fed	$	4·10	4·10	4·10	5·10
Total cost of feed	$	11·19	11·19	11·19	12·19
Cost to produce 100 pounds fat	$	17·49	19·56	18·52	20·53
Cost to produce 1 pound fat	$	0·174	0·195	0·185	0·205
Cost to produce 1 pound butter	$	0·146	0·163	0·154	0·172
Profit on 1 pound butter at 30 cents per pound	$	0·154	0·137	0·146	0·128
Cost to produce 100 pounds milk	$	0·689	0·809	0·749	0·82
Profit on 100 pounds milk at $1.70 per hundredweight	$	1·01	0·90	0·951	0·88
Total weight of cows for period	lb.	10,311	10,214	....	10,315
Gain or loss in weight	"	....	(91 loss)	....	(4 gain)

OTTAWA.

Reviewing the results, it will be seen that while the amount of roughage necessary to produce 100 pounds of fat or milk is much lower where molasses is fed, the cost to produce, as figured on the values given, is increased when compared with the average results of the root-feeding periods, while the actual production of milk during the molasses feeding period is slightly lower.

In this experiment, 254 pounds molasses, 5 pounds meal, and 6 pounds hay are equivalent to 1,890 pounds roots. At the given valuation, molasses thus has a value of $10.20 per ton for milk production.

From the results as obtained, the general conclusion may be made that while molasses may replace a part of the succulent ration, it cannot wholly replace roots either from the standpoint of increased production or lessened cost.

DAIRY COW FEEDING EXPERIMENT No. 6.

ENSILAGE *versus* MOLASSES.

At the same time as experiment No. 2 there was conducted with the aged Guernsey and Jersey cows a somewhat similar test to determine, if possible, the value of cane molasses in replacing ensilage as a succulent feed for milch cows.

Plan of Experiment.—The meal mixture used throughout the experiment was composed as follows: Bran, 4 parts; gluten feed, 2 parts; corn meal, 2 parts; oil cake, 1 part; cottonseed, 2 parts.

Period 1.—Meal, hay, ensilage, 30 pounds.
Period 2.—Meal, hay, ensilage, 15 pounds; molasses, 4 pounds.
Period 3.—Meal, hay, ensilage, 30 pounds.

Plan of Feeding.—Each cow was fed 1 pound meal mixture for each 4 pounds of milk produced.

Each cow was fed what hay she would clean up during the first week of period 1, and approximately the same quantity throughout the rest of the experiment.

Each cow received ensilage and molasses as above described, the molasses being poured on the ensilage.

Value of Feeds per Ton.—Hay, $7; roots and ensilage, $2; molasses, $23; meal, 1·3 cent per pound.

TABLE No. 6.—Dairy Cow Feeding Experiment No. 6.—Ensilage *versus* Molasses.

Feeds.		Meal, Hay, Ens. 30 lb. — Period 1.	Meal, Hay, Ens. 30 lb. — Period 3.	Meal, Hay, Ens. 30 lb. — Periods 1 and 3 Average	Meal, Hay, Ens. 15 lb. Mol. 4 lb. — Period 2.
Number of cows in test		9	9	9	9
Pounds of milk produced by nine cows	lb.	1,421	1,190	1,305	1,369
Average milk per cow per day	"	22·7	18·9	20·7	21·7
Average per cent fat in milk	p.c.	5·7	5·7	5·7	5·7
Total pounds fat produced by nine cows	lb.	80·9	67·8	74·4	78
Average pounds fat per cow per day	"	1·29	1·08	1·18	1·24
Total meal consumed	"	630	630	630	630
Total hay consumed	"	378	378	378	378
Total molasses consumed					252
Total ensilage consumed	"	1,890	1,890	1,890	945
Roughage consumed per 100 pounds fat produced	"	2,803	3,343	3,073	2,019
Relative value for production of fat	l.c.			100	152
Roughage consumed per 100 pounds milk produced	lb.	150	190	175	114
Relative value for production of milk	p.c.			100	152
Findings from Experiment—					
Cost of meal mixture fed	$	8·19	8·19	8·19	8·19
Value of roughage fed	$	3·21	3·21	3·21	3·84
Total cost of feed	$	11·40	11·40	11·40	12·03
Cost to produce 100 pounds fat	$	14·09	16·81	15·45	15·42
Cost to produce 1 pound fat	$	0·14	0·168	0·154	0·154
Cost to produce 1 pound butter	$	0·117	0·129	0·128	0·129
Profit on 1 pound butter at 30 cents per pound	$	0·183	0·171	0·173	0·171
Cost to produce 100 pounds milk	$	0·802	0·948	0·875	0·877
Profit on 100 pounds milk at $1.70 per hundredweight	$	0·898	0·752	0·825	0·823
Total weight of cows for period	lb.	8,890	8,814		8,856
Gain or loss in weight	"		(loss 42)		(loss 34)

Comparing the average of periods I and III with period II it would appear that the replacing of 15 pounds of ensilage with 4 pounds of molasses resulted in an increase in milk production sufficient to offset the greater cost of the ration. Another point worthy of notice is the falling-off in weight in both periods II and III.

In the foregoing experiment, 252 pounds of molasses is equivalent to 31 pounds meal, 20 pounds hay, and 1,039 pounds ensilage. At the valuations given for the various feeds, molasses would have a value of only $11.90 per ton for milk production.

Method of Feeding Molasses.—Brief mention might be made regarding the method of feeding molasses, this operation frequently presenting difficulty during cold weather. It was found necessary to dilute the molasses slightly with hot water and to reduce its consistency still further by heating over a small stove. It was then poured over the hay or ensilage by means of an ordinary watering-can. While molasses is frequently successfully fed in its original state, the particular requirements of these experiments made necessary the adoption of the above described method.

GENERAL CONCLUSIONS FROM EXPERIMENTS NO. 5 AND NO. 6.

The experiments just reported were not planned to induce the dairymen to discontinue the growing of roots and corn or to lessen the acreage usually devoted to these crops. Rather, it was desired to gather some information as to how molasses might be regarded among the succulent feeds and, in the event of shortage, the possibility of replacing all or parts of the ensilage or root ration with this much discussed foodstuff.

OTTAWA.

That turnips and ensilage cannot wholly be replaced by molasses has been shown. That a part of the two former feeds could be eliminated and economically replaced by molasses is probable from the results of the tests just described and from others conducted in the past two years and already reported. The value of molasses, it must be remembered, is primarily in its appetizing and tonic properties. Its best effect is, therefore, derived in an indirect way, that is, through its power to increase palatability and digestibility, with the consequent increase in the amount consumed, and the benefit derived therefrom. These desirable properties must be considered entirely aside from its actual food value, which is limited, and usually overestimated.

CALF FEEDING EXPERIMENTS.

During the past year a number of calf feeding experiments have been started, from which valuable information is being acquired. However, at the close of the fiscal year only five lots of calves had completed their experimental period, hence the complete detailed report will be given in the annual report for the coming fiscal year. A brief summary of the results of the first five lots will, however, show the work which is under way.

Lot 1, three calves 6 weeks of age at the start, fed on whole milk, clover hay, and roots, made splendid gains, which, however, cost $14.15 per hundred pounds. This lot was used as a check on the various calf meals.

Lot 2 was fed on a home-mixed calf meal composed of two parts fine ground oats, four parts fine ground corn, and one part ground flax. The three calves in this lot (4 weeks of age at the start), fed the above meal plus skim-milk plus clover hay and roots, made gains costing only $3.04 per hundred pounds.

Lot 3. The three calves in this lot were 12 weeks of age at the start of the experiment. They were fed Blatchford's calf meal as a water slop, plus clover hay and roots, but with no skim-milk. They made very satisfactory gains, which cost only $2.36 per hundred pounds. The greater and cheaper gains over lot 4 are due probably to the increased age of the calves at the start of the experiment.

Lot 4. The three calves were 8 weeks of age at the start of this experiment. They were fed Blatchford's calf meal, skim-milk, clover hay, and roots, and made very satisfactory gains, costing $4.48 per hundred pounds.

Lot 5 contained only two calves, which started this experiment at 2 weeks of age. They were fed Bibby's cream equivalent, skim-milk, clover hay, and roots. These calves made exceedingly satisfactory gains, which cost only $3.01 per hundred pounds.

The above and several other meals are being tried at the present time, ten lots of calves being in the experiment. All work is being duplicated, both during the winter and summer months, and it is hoped that before the end of the coming fiscal year a large amount of conclusive and satisfactory data will be acquired. This work is also being duplicated on several of the branch Farms, reference to which will be made elsewhere in this report.

MISCELLANEOUS EXPERIMENTS.

A number of miscellaneous experiments with dairy utensils and the like were made during the year, but the data acquired are not sufficiently complete to report on definitely.

An insulated milk or cream can for shipping purposes manufactured by the Sturges & Burn Manufacturing Co., 508 So. Green street, Chicago, U.S.A., was tested. The insulation in this can is very satisfactory. The temperature of milk shipped from the Farm to the city remained practically the same for over two hours, while milk shipped

in ordinary cans showed a rise in temperature of from 10 to 20 degrees. Further work will be done regarding the testing of this can during the coming summer.

Several types of milk strainer have been tried during the year. One which gives promise of marked success is the Ekvall sanitary milk strainer, manufactured by the Elgin Sheet Metal Products Co., Elgin, Ill., U.S.A. This is an all-metal strainer, but is so arranged in parts that the dirt does not accumulate on the surface of the strainer hence is not washed nearly as much as by the old methods of straining. Further bacteriological studies of these various milk strainers will be conducted as soon as a bacteriologist is available for such work.

Owing to the most unfavourable housing facilities for calves during the spring and summer of 1914, we were troubled with several cases of diarrhoea, which very closely resembled the contagious white scour. Several patented preventives were tried, amongst which was a patented cure called "Agronoma," manufactured by the Antimycel Chemical Co., Ottawa. Although, fortunately, there were not sufficient cases to make a thorough trial of the various cures, yet the old treatments of lime water, parched flour, and formaldehyde gave the most satisfactory results.

MILKING MACHINES.

As reported previously, the experimental work with milking machines started in the fall of 1912, the first year's work dealing largely with a comparison of the Sharples milking machine with good hand milking. All experimental work with milking machines was of necessity discontinued on October 11, 1913, due to the loss of the buildings by fire. The new building being completed, the Sharples and several other makes of milking machines were installed, and an experiment was started on November 1, 1914.

It might be well here to summarize the year's work with the Sharples mechanical milker as compared with the previous year and the subsequent year on hand milking under somewhat similar conditions. The following table gives the year's lactation periods of twenty cows during 1911 on hand milking, 1912 and the first part of 1913 with the milking machine, and the latter part of 1913 and 1914 to November 1 on hand milking.

SUMMARY for Sharples Milking Machine Experiment.

	Breed	1911, HAND MILKING.				1912, MACHINE MILKING.				1913, HAND MILKING.				1914, JAN. 1 TO NOV. 1, HAND MILKING.			
		Age at Start.	Days Milking.	Milk Produced.	Average Milk per Day.	Age at Start.	Days Milking.	Milk Produced.	Average Milk per Day.	Age at Start.	Days Milking.	Milk Produced.	Average Milk per Day.	Age at Start.	Days Milking.	Milk Produced.	Average Milk per Day.
		Yrs.	Days.	Lb.	Lb.	Yrs.	Days.	Lb.	Lb.	Yrs.	Days.	Lb.	Lb.	Yrs.	Days.	Lb.	Lb.
Marjorie 4th	A.	3	298	6,480	21·7	4	242	5,657	23·4	......	......	......	......	......	......	......	......
Flavia 2nd	A.	5	267	9,364	35·1	6	332	10,319	31·0	7	327	9,493	29·0	8	175	7,610	43·4
Jessie D.	A.	5	273	5,905	21·6	6	287	5,415	18·8	7	237	4,746	20·0	......	......	......	......
Ottawa Kate	A.	4	281	5,644	20·0	5	367	10,451	28·4	6	395	12,262	31·0	7	183	8,192	44·7
Denty 4th	A.	4	244	7,839	32·2	5	269	8,699	32·3	6	341	7,280	21·4	7	175	6,323	36·1
Marjorie 2nd	A.	5	312	7,617	24·4	6	244	5,547	22·7	......	......	......	......	......	......	......	......
Flavia 3rd	A.	3	307	6,776	22·1	4	223	7,223	22·4	5	269	6,258	23·3	6	186	7,068	38·0
Marjorie 6th	A.	2	384	7,203	18·7	3	318	5,334	16·8	......	......	......	......	5	212	5,474	25·7
Ottawa Kate 2nd	A.	2	371	6,623	17·9	3	299	5,056	16·9	4	368	9,216	25·0	5	352	9,024	25·6
Maggie Pulchrae	A.	2	419	6,552	15·6	3	308	7,258	23·5	4	285	6,929	24·3	5	182	5,262	28·9
Denty 3rd	A.	6	335	7,635	22·8	7	288	5,448	18·9	8	408	9,757	23·9	9	406	9,671	23·8
La Belle	FC.	6	336	6,815	20·2	7	315	5,764	18·3	8	304	4,767	15·6	......	......	......	......
Fortune 4th	FC.	4	286	7,462	26·1	5	289	5,834	20·1	6	413	9,722	23·5	7	123	4,690	38·6
Aromaz	FC.	4	305	6,769	22·2	5	306	6,614	21·6	6	403	7,925	19·6	7	165	5,943	36·0
Inoquette 3rd	FC.	3	261	4,803	18·4	4	396	7,810	19·7	5	381	6,830	17·9	......	......	......	......
Fortune Cadette	FC.	2	292	4,950	16·9	3	319	5,797	18·2	......	......	......	......	......	......	......	......
Archer's Pearl	G.	2	297	4,148	14·0	3	615	8,120	13·2	4	335	6,002	17·8	......	......	......	......
Ottawa-Deanie	G.	2	335	4,780	14·2	3	359	5,083	14·4	4	340	7,236	21·2	5	340	7,336	21·5
Ottawa Itchen	G.	6	280	7,029	25·1	7	296	4,269	14·4	8	350	8,415	24·0	9	349	8,484	24·2
Itchen's Favour	G.	2	546	8,370	13·5	3	363	6,389	17·6	......	......	......	......	4	271	6,384	23·5
Totals	......	20 head.	6,429	132,764	......	20 head.	6,385	132,087	......	15 head.	5,156	116,838	......	13 head.	3,119	91,461	......
Averages	......	......	321·4	6,638	20·7		318·4	6,604	20·6	......	343·7	7,786	22·6	......	239·9	7,035	29·3

N.B.—Sharples machine started July, 1912. 2. The year denotes the time when the cows freshened. 3. In 1912 year, many of the above-mentioned cows were milked a month or two by hand. 4. In 1913 year, many of the above-mentioned cows were milked two or three months by the machine.

DATA FROM FIRST EXPERIMENT.

It will be noticed that the total milk flow per cow per day in 1912 was greater than in 1911, this being due probably more to the fact that the lactation periods were shorter and the cows were one year older than to the influence of the milking machine. However, the year 1913 showed a marked increase over the year 1912. The average of the years 1911 and 1913 compared with 1912 shows that the cows have not very materially decreased in their milk flow owing to the influence of the Sharples milking machine. The very marked increase in parts of the lactation period for 1914, included in this table, is due largely to the fact that fewer cows are included and, even more important, that the lactation periods are not completed, consequently the average per cow per day is higher than it would be after all the cows had completed their full milking period. Although nothing definite can be drawn from the above table, yet we feel safe in saying that in so far as these and other figures for cows not included in this table go, the use of the milking machine has not shown a very marked decrease in the milk produced by this herd.

The quantity of strippings produced after the milking machine was quite variable, in the case of some cows the strippings after each milking amounting to from one half to 1½ pounds. These, however, were the exceptions, and the average strippings taken from the cow after the machine ranged from one eighth to 1 pound per cow per milking.

The practical difficulties encountered with this machine are as follows:—

1. Cows inclined to be nervous sometimes kick off the teat cups. These cups, not being suspended in any way, immediately fall to the floor and suck in bedding, dust, or any other filth, much to the detriment of the quality of the milk. Although such accidents are more or less rare, still it must be remembered that one accident of this kind per milking will largely deteriorate the quality of the milk for that milking if the milk is poured with the clean, pure milk from the other cows and if the machine is again used on another cow without being thoroughly washed and sterilized.

2. A little trouble was met with in the pulsators occasionally sticking, becoming slow. The careful supervision of the herdsman was required to keep these pulsators thoroughly cleaned and oiled in order that pulsation might be normal and uniform.

3. Absolute gentleness in the introduction of the machine to the cows is necessary in order not to antagonize any animals permanently against the machine.

4. The absolute cleansing of the machine was necessary in order to keep down the bacterial count. This point will be dealt with in the succeeding paragraph.

Undoubtedly it has been proved in this year's test that the successes or failures which may be met with depend very largely on the man who is operating the machine. Carelessness in adjusting the machine to the cow, lack of intelligence in operating each machine to suit the individual needs of each cow, or any similar lack of care, will undoubtedly cause a loss from that cow upon introducing the milking machine.

PURITY OF THE MILK.

During the first six months of this test it was found that the milk produced by the Sharples milking machines contained on an average three to ten times as many bacteria as that of scrupulously careful hand milking, the counts ranging from 5,000 to 70,000 bacteria per cc., as all precautions were being taken to produce the equivalent of

"certified" milk. During the three succeeding months of the test, by the aid of improved methods of washing, sterilizing, and manipulating the machine, together with the beneficial influence of the cold winter weather, far better results were obtained from the milking machine as to purity, although even here the hand-produced milk contained, as a rule, less than one-third the total bacteria. As the warmer weather of the summer of 1913 advanced, the milking machine again showed much greater difficulty in producing pure milk than by good, careful hand milking. All samples for these tests were taken from the cans immediately after the straining of the milk. In all cases it was found that when the rubber tubing was new and perfectly smooth, the machine-produced milk compared very well with hand-produced milk; but as soon as the surface of the rubber showed any wear, the bacterial count immediately rose from three to ten times the former count, owing to the impossibility of thoroughly cleansing the rubber surface from adhering milk. In either hand-milking or machine-milking the purity of the milk is dependent on the following factors:—

(1.) The cleanliness of the cows.
(2.) The purity of the air in the barn.
(3.) Careful milking to eliminate contamination.
(4.) Thorough washing and sterilizing of the utensils which come in contact with the milk at any period of its handling.

The sterilizing of the milking machine was studied carefully. No figures sufficiently definite for publication were acquired. Roughly speaking, however, it is safe to say that rinsing the machine with cold and afterwards with lukewarm water will produce a bacterial count in the milk from 200 to 500 times as great as good careful hand milking; whereas the careful rinsing in cold and then hot water containing a good washing soda, and this followed by a thorough cleansing with the brushes provided, the steam sterilizing of all metal parts, and the sterilizing of all the rubber parts in a 10 per cent salt solution, 5 per cent limewater solution, or 2½ per cent formalin solution, will give far more satisfactory results, and, if other precautions are also taken, the bacterial count should not range above five or six times that of careful hand milking.

PATHOLOGICAL EFFECT OF MACHINE ON COWS.

No ill-effects whatever on the cows' teats resulted from the use of the milking machine. After the machine commenced in the test a case of what appeared to be contagious garget was noticed. This rapidly disappeared and the cow came back to nearly her normal flow. Several other cases appeared shortly after, but, although the best pathologists were consulted regarding this matter, and the milk was studied carefully bacteriologically, yet, unfortunately, no organisms were isolated. It would appear, however, that this was a form of contagious garget, and could in no way be charged to the machine. The great disadvantage of any milking machine in a herd where contagious garget prevails is not that the machine induces this trouble in any sense, but is due to the fact that the machine may be spreading this trouble for one or two milkings before any thickness is noted either in the udder or in the milk taken from the same. A careful, intelligent hand milker, on the other hand, would probably notice this at once, with the result that in the future this cow, until cured, would be milked last and would probably be isolated from the other cows, her milk being also kept separate. This is an unfortunate fault of mechanical milking, but can be quite largely overcome by the careful observation of the man operating the machine.

PRESENT EXPERIMENTS WITH MILKING MACHINES.

On October 1, 1914, a new series of experiments was started, comparing good hand milking with the Burrell-Lawrence-Kennedy milker and the Sharples machine. In

addition to these two machines, two newer models, namely, the Empire and the Lister milking machines, are also installed, for comparative purposes. The first year of this second series of experiments with milking machines is for the comparison of the various machines with each other and with good hand milking. As yet, only three of the experimental periods out of a total of twelve have been completed, and it would be unwise to give these data without the more conclusive duplication in the latter part of the experiment.

DAIRY HERD RECORDS.

Following are the dairy cow milk records for all cows which have finished a lactation period during the fiscal year ending March 31, 1915. Special attention is drawn to the fact that a number of the best cows in each of the herds had not at this date finished their lactation period, hence the following figures would not be a fair comparison of the breeds.

In the case of heifers with their first calves, charges for feed include the consumption from a date two months previous to parturition, to the time of being dried off preparatory to their second calving. In the case of heifers and cows 3 years old and over, charges for feed include the period in which they were dry previous to the lactation period herein reported.

In estimating the cost of feeds, the following values were used:—

Pasture, per month..	Per cow.	$ 1 00
Meal mixture..	Per ton.	25 00
Hay..	"	7 00
Straw..	"	4 00
Roots and ensilage..	"	2 00
Green feed..	"	3 00

These valuations represent fairly well the cost of raising these products, as contained in the report of the Field Husbandry Division for the Central Experimental Farm.

In calculating the value of products, 30 cents per pound is allowed for butter and 20 cents per hundred pounds for skim-milk and buttermilk. In reality, a considerable quantity of milk conforming to the "certified" standard has again been sold at $3 per hundred pounds; the price of butter ranged from 30 to 35 cents per pound; cream cheese sold realized over $3 per hundred pounds of milk; and coulommier cheese sold realized from $2.20 to $3 per hundred pounds of milk.

However, the above figures chosen for calculation were regular market values and form a basis for comparison of the various individuals in the herd with each other, for this and previous fiscal years, as well as with individuals of other herds on the branch Farms and Stations or on the farms of private individual farmers.

In computing these returns it will be noted that the bedding and labour in connection with the caring for cattle and also the manufacture of butter, cost of handling milk, and the like, have not been accounted for. On the other hand, the value of the manure made and the value of the calves at birth will more than counterbalance the above-mentioned items, although not sufficiently to overcome the interest and depreciation of the buildings and cattle. However, the following statements are used as a general basis for calculating the returns from the cattle, and the other items may be added by any farmer as they may be required.

Although the following list represents the cows which have finished a lactation period during the year, yet it does not by any means represent the total number of cows which have been milked during the past fiscal year, as many have failed to finish their lactation period.

OTTAWA.

OFFICIAL RECORDS OF PRODUCTION.

Although the herd records on the Central Experimental Farm are always considered official, yet the policy of the Farm is to place individual cows under tests similar to the cows of private individuals, and conduct the same under similar supervision. In consequence of this policy, pure-bred individual cows from the various herds on the Central Experimental Farm have during the past year been entered in the Record of Performance. The table given herewith of cows which have completed their official test is interesting for comparison with the herd records given in the second following table.

CANADIAN Record of Performance (April 1, 1914, to March 31, 1915).

Name of Cow.	Breed.	Age at commencement of test.	Number of days milking.	Pounds of milk produced.	Pounds of fat produced.	Average per cent fat.
			Days.	Lb.	Lb.	p. c.
Denty 3rd of Ottawa	Ayrshire	8 years	365	9,271	416	4·48
Ottawa Kate 2nd	Ayrshire	4 years 31 days	365	9,097	404	4·44
Ottawa Deanie	Guernsey	4 years 108 days	345	7,355	431	5·86
Ottawa Itchen	Guernsey	8 years	361	8,546	473	5·52
Beulah Clay 3rd	Holstein	2 years 105 days	365	9,394	301	3·20
Brampton Blue Duchess	Jersey	4 years 42 days	365	9,775	514	5·25
Brampton Oakland's Trial	Jersey	3 years 342 days	365	9,082	578	6·36

OTTAWA.

Names and Breeds of Cows.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of days in Lactation Period.	Total pounds of Milk for Period.	Daily average Yield of Milk.	Average per cent Fat in Milk.	Pounds of butter produced in period.	Value of Butter at 30c. per pound.
	Yrs		Days.	Lb.	Lb.	p. c.	Lb.	$ cts.
Brampton Oakland's Trial..........J.	3	Nov 10, 1913...	417	9,674	23·1	6·72	765·35	229 60
Jennie of Parkdale..............G.H	6	May 22, 1913...	525	15,157	28·8	3·84	685·35	205 60
Brampton Blue Duchess............J.	4	Nov. 20, 1913...	376	9,726	25·8	5·41	619·42	185 82
Ottawa Itchen.....................G.	8	Nov. 16, 1913...	361	8,544	23·6	5·43	546·28	163 88
Inoquette.........................F.C.	10	May 9, 1913...	417	7,928	19·0	5·28	492·54	147 76
Ottawa Deanie.....................G.	4	Nov. 25, 1913...	345	7,352	21·3	5·85	506·70	152 01
Mountain Queen..................G.H.	5	Feb. 23, 1914...	342	10,735	31·3	3·82	484·18	145 25
Itchen's Girl......................G.	4	Oct. 14, 1913...	328	7,099	21·6	5·52	461·57	138 47
Jennie Dean.....................G.A.	7	Dec. 13, 1913...	352	10,796	30·6	4·24	538·76	161 62
Aromaz.........................F.C.	5	Mar. 14, 1913...	403	7,925	19·6	5·31	495·27	148 58
Fortune 4th of Ottawa...........F.C.	6	May 21, 1913...	416	9,722	23·3	4·44	508·78	152 63
Sangster's Mayflower...........G.H.	7	Sept. 23, 1913...	495	13,301	26·8	3·68	575·88	172 76
Annie Laurie....................G.A.	7	Dec. 2, 1913...	322	10,034	31·1	4·06	479·86	143 95
Brampton Sultana Tena (imp.)....J.	4	Sept. 1, 1913...	344	6,753	19·6	5·57	442·78	132 83
Ottawa Itchen's Favour............G.	5	Feb. 4, 1914...	391	7,320	18·7	5·40	465·37	139 61
Denty 3rd of Ottawa...............A.	8	Aug. 29, 1913,..	406	9,671	23·8	4·29	488·28	146 48
Betty...........................G.A.	8	Dec. 15, 1913...	440	10,838	24·6	3·85	491·50	147 45
Ottawa Kate 2nd...................A.	4	Nov. 14, 1913...	372	9,106	24·4	4·30	461·49	138 44
Fortune Cadette.................F.C.	4	Jan. 31, 1914...	391	7,982	20·4	4·47	420·00	126 00
Arthur's Princess...............G.H.	5	Nov. 24, 1912...	522	13,799	26·4	3·18	516·25	154 87
Archer's Pearl.....................G.	4	Oct. 20, 1913...	336	6,002	17·8	5·59	395·17	118 55
Surprise........................G.H.	6	Dec. 24, 1913...	377	11,892	31·5	3·33	467·28	140 18
Polly 2nd.......................G.A.	6	May 14, 1913...	367	9,619	26·2	3·49	396·04	118 81
Tannahill's Diamond............G.H.	6	Oct. 13, 1913...	441	11,942	27·0	3·47	488·32	146 49
Pearly's Maid......................G.	3	Jan. 6, 1914...	388	6,066	15·6	5·56	397·20	119 16
Arthur's Rose...................G.H.	7	Feb. 24, 1914...	353	9,582	27·1	3·90	439·94	131 98
Maud............................G.A.	6	Feb. 3, 1914...	260	6,332	24·3	4·47	333·31	99 99
Beulah Clay 3rd....................H.	2	June 23, 1913...	361	9,412	26·0	3·42	379·23	113 76
Mountain Jewel..................G.H.	8	Feb. 23, 1914...	331	9,392	28·3	3·60	398·02	119 40
Ruby's Pride.......................G.	4	Jan. 12, 1914...	322	5,200	16·1	5·87	359·36	107 80
Brampton Rosa Bonheur...........J..	4	Sept. 11, 1913...	352	5,841	16,5	5·03	345·76	103 72
La Belle........................F.C.	9	May 23, 1914...	307	5,759	18·7	4·54	308·21	92 46
Lavene..........................G.H.	6	Jan. 30, 1914...	280	7,553	26·9	3·64	324·27	97 28
Itchen's Pride.....................G.	4	July 4, 1913...	385	5,906	15·3	5·02	349·44	104 83
Nussey..........................G.H.	5	Feb. 8, 1914...	351	8,366	23·8	3·55	350·05	105 01
Milkmaid........................G.A.	9	Jan. 17, 1914...	287	7,617	26·5	3·94	353·44	106 03
Flavia 3rd of Ottawa..............A.	6	Apr. 30, 1914...	314	8,208	26·1	3·89	376·23	112 86
Operatrice......................F.C.	5	Aug. 28, 1913...	483	6,992	14·4	4·54	374·05	112 21
Dolly...........................G.A.	7	Oct. , 1913...	414	7,689	18·5	4·31	390·75	117 22
Maggie Pulchrae...................A.	5	May 3, 1914...	333	7,344	22·0	3·97	342·47	102 74
Elegante Poupee.................F.C.	3	June 9, 1913...	351	5,208	14·8	4·92	301·52	90 45
Marjorie 6th of Ottawa............A.	4	Apr. 27, 1914...	286	6,414	22·4	4·33	327·28	98 18
Zaza Fille 2nd..................F.C.	4	Apr. 5, 1914...	255	4,989	19·5	4·66	273·63	82 08
Flavia (imp).......................A.	11	Sept. 22, 1913...	367	7,974	21·7	3·79	355·58	106 67
De Clairvaux....................F.C.	2	Sept. 24, 1913...	331	5,676	17·1	3·86	257·91	77 37
Inoquette 4th...................F.C.	4	Nov. 7, 1913...	332	4,329	13·0	5·43	276·96	83 08
Daisy...........................G.A.	7	Feb. 27, 1914...	293	5,433	18·5	3·90	249·66	74 89
Duchesse Sauvee.................F.C.	5	Apr. 5, 1914...	292	4,508	15·4	5·18	275·04	82 51
Pearl...........................G.H.	8	Feb. 1, 1914...	234	4,759	20·3	3·92	219·51	65 85
Clothilde Hengerveld Korndyke.H.	3	Sept. 4, 1913...	456	5,949	13·0	3·85	269·54	80 86

Value of Skim-milk at 20c. per cwt.	Total value of Product.	Amount of Meal eaten, at 1¼c. per pound.	Amount of Roots and Ensilage eaten, at $2 per ton.	Amount of hay eaten, at $7 per ton.	Amount of Green Feed eaten, at $3 per ton.	Amount of Straw eaten, at 20c. per cwt.	Months on Pasture, at $1 per month.	Total cost of Feed between calvings.	Cost to Produce 100 pounds of Milk.	Cost to Produce 1 pound of Butter, skim-milk neglected.	Profit on 1 pound of Butter, skim-milk neglected.	Profit on Cow between calvings, labour and calf neglected.
$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mo.	$ cts.	Cts.	Cts.	Cts.	$ cts.
18 04	247 64	4,209	8,360	3,039	3,700	302	1	78 75	81·4	10·2	19·8	168 89
29 14	234 74	4,900	19,085	2,634	6,740	505	......	100 66	66·4	14·6	15·4	134 08
18 39	204 21	4,186	7,585	2,853	3,700	178	1	76 78	78·9	12·3	17·7	127 43
16 15	180 03	4,064	8,545	2,892	5,170	298	1	78 80	92·2	14·4	15·6	101 23
15 01	162 77	3,304	7,060	2,673	2,450	183	2	63 74	80·3	12·9	17·1	99 03
13 84	165 85	3,404	7,585	2,853	3,700	178	1	67 01	91·1	13·2	16·8	98 84
20 68	165 93	4,118	6,940	1,974	3,700	246	......	71 35	66·4	14·7	15·3	94 58
13 41	151 88	2,956	6,060	2,487	3,700	56	1	58 37	82·2	12·6	17·4	93 51
20 67	182 29	4,897	13,460	2,352	3,700	352	......	89 15	82·5	16·5	13·5	93 14
15 00	163 58	3,696	12,105	2,634	2,450	557	1	73 29	92·4	14·7	15·3	90 29
18 57	171 20	4,167	13,965	3,192	2,450	634	1	83 14	85·5	16·3	13·7	88 06
25 62	198 38	5,820	17,145	3,588	5,380	220	......	110 95	83·4	19·2	10·8	87 43
19 25	163 20	3·966	12,695	2,088	3,700	352	......	75 81	75·5	15·8	14·2	87 39
12 75	145 58	3,031	5,860	2,283	3,700	56	1	58 39	86·4	13·1	16·9	87 19
13 84	153 45	3,528	6,920	2,919	3,700	240	1	68 26	93·2	14·6	15·4	85 19
18 51	164 99	4,534	8,790	3,037	6,450	259	2	88 26	91·2	18·0	12·0	76 73
20 84	168 29	4,877	15,855	2,808	3,700	352	......	92 88	85·6	18·8	11·2	75 41
17 42	155 86	4,419	8,195	2,888	4,000	178	1	80 87	88·8	17·5	12·5	74 99
15 25	141 25	2,998	12,550	2,676	3,720	358	1	66 67	83·5	15·8	14·2	74 58
26 72	181 59	5,245	25,405	3,022	3,040	924	....	107 93	78·2	20·9	9·1	73 66
11 33	129 88	2,853	6,060	2,487	3,700	56	1	57 08	95·1	14·4	15·6	72 80
22 98	163 16	5,249	8,945	3,198	3,700	240	......	91 77	77·1	19·6	10·4	71 39
18 56	137 37	3,506	13,365	2,148	3,040	577	......	70 40	73·1	17·7	12·3	66 97
23 05	169 54	5,662	18,045	2,454	3,700	352	......	103 64	86·7	21·2	8·8	65 90
11 45	130 61	3,406	5,810	2,646	3,700	302	1	64 79	106·8	16·3	13·7	65 82
18 41	150 39	4,248	17,215	2,460	3,700	169	......	84 80	88·4	19·2	10·8	65 57
12 09	112 08	2,691	6,000	1,275	3,700	....	......	49 64	78·3	14·8	15·2	62 44
18 17	131 93	3,652	6,395	2,838	3,450	176	2	69 49	73·8	18·3	11·7	62 44
18 10	137 50	4,118	11,710	1,854	3,700	....	......	75 21	80·0	18·8	11·2	62 29
9 78	117 58	2,912	4,485	2,385	3,700	122	1	56 01	107·7	15·5	14·5	61 57
11 09	114 81	2,868	5,855	2,379	3,700	56	1	56 68	97·0	16·3	13·7	58 13
10 97	103 43	2,257	5,360	1,172	5,100	364	1	47 04	81·6	15·2	14·8	56 39
14 55	111 83	2,956	9,090	1,392	3,700	....	......	56 46	74·7	17·4	12·6	55 37
11 21	116 04	3,013	7,140	2,259	4,650	176	1	61 02	103·3	17·4	12·6	55 02
16 13	121 14	3,593	7,900	2,573	3,700	....	......	67 36	80·5	19·2	10·8	53 78
14 63	120 66	3,392	12,180	2,088	3,700	414	......	68 25	89·6	19·3	10·7	52 41
15 77	128 63	4,194	6,000	3,130	4,000	274	1	76 91	93·7	20·4	9·6	51 72
13 34	125 55	3,695	9,585	3,321	3,700	302	1	74 53	106·5	19·9	10·1	51 02
14 71	131 93	4,308	13,361	2,382	3,700	512	......	82 11	106·7	21·0	9·0	49 82
14 10	116 84	3,850	4,675	2,878	4,000	274	1	70 40	95·8	20·5	9·5	46 44
9 90	100 35	2,975	7,025	2,317	2,450	197	1	57 36	110·1	19·0	11·0	42 99
12 27	110 45	3,204	8,140	3,516	4,000	168	1	67 82	105·7	20·7	9·3	42 63
9 51	91 59	2,287	8,590	2,326	5,100	184	1	54 32	108·8	19·8	10·2	37 27
15 34	122 01	3,835	13,025	3,409	6,450	473	2	85 49	107·2	24·0	6·0	36 52
10 91	88 28	2,825	5,685	2,325	3,700	....	1	55 67	98·0	21·5	8·7	32 61
8 18	91 26	2,898	6,835	2,673	3,700	118	1	59 18	136·7	21·3	8·9	32 08
10 44	85 33	2,860	6,960	1,464	3,700	....	......	53 38	98·2	21·3	8·7	32 95
8 54	91 05	2,446	10,520	2,656	5,080	362	1	59 72	132·4	21·7	8·3	31 33
9 12	74 97	2,402	6,770	1,116	3,700	....	......	46 24	97·1	21·0	9·0	28 73
11 43	92 29	3,424	8,525	3,318	4,000	150	1	70 23	118·0	26·0	4·0	22 06

OTTAWA.

AYRSHIRES.

Name of Cow.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of Days in Lactation Period.	Total pounds of Milk for Period.	Daily Average Yield of Milk.	Average per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 30c. per Pound.
	Yrs.		Days	Lb.	Lb.	p. c.	Lb.	$ cts.
Denty 3rd of Ottawa	8	Aug. 29, 1913	406	9,671	23·8	4·29	488·28	146 48
Ottawa Kate 2nd	4	Sept. 22, 1913	372	9,106	24·4	4·30	461·49	138 44
Flavia 3rd of Ottawa	6	Apr. 30, 1914	314	8,208	26·1	3·89	376·23	112 86
Maggie Pulchrae	5	May 3, 1914	333	7,344	22·0	3·97	342·47	102 74
Marjorie 6th of Ottawa	4	Apr. 27, 1914	286	6,414	22·4	4·33	327·28	98 18
Average, 5 best	5		342	8,148	23·7	4·15	399·15	119 74

CANADIANS.

Name of Cow.	Age	Date of Dropping Calf.	Days	Milk, Lb.	Daily Avg., Lb.	Fat, p. c.	Butter, Lb.	Value, $ cts.
Inoquette	10	May 9, 1913	417	7,928	19·0	5·28	492·54	147 76
Aromaz	5	Mar. 14, 1913	403	7,925	19·6	5·31	495·27	148 58
Fortune 4th of Ottawa	6	May 21, 1913	416	9,722	23·3	4·44	508·78	152 63
Fortune Cadette	4	Jan. 31, 1914	391	7,982	20·4	4·47	420·00	126 00
La Belle	9	May 23, 1914	307	5,759	18·7	4·54	308·21	92 46
Average, 5 best	7		386	7,863	20·2	4·80	444·96	133 48

GRADE AYRSHIRES.

Name of Cow.	Age	Date of Dropping Calf.	Days	Milk, Lb.	Daily Avg., Lb.	Fat, p. c.	Butter, Lb.	Value, $ cts.
Jennie Dean	7	Dec. 13, 1913	352	10,796	30·6	4·24	538·76	161 62
Annie Laurie	7	Dec. 2, 1913	322	10,034	31·1	4·06	479·86	143 95
Betty	8	Dec. 15, 1913	440	10,838	24·6	3·85	491·50	147 45
Polly 2nd	6	May 14, 1913	367	9,619	26·2	3·49	396·04	118 81
Maud	6	Feb. 3, 1914	260	6,332	24·3	4·47	333·31	99 99
Average, 5 best	7		348	9,523	27·3	4·02	447·89	134 36

GRADE HOLSTEINS.

Name of Cow.	Age	Date of Dropping Calf.	Days	Milk, Lb.	Daily Avg., Lb.	Fat, p. c.	Butter, Lb.	Value, $ cts.
Jennie of Parkdale	6	May 22, 1913	525	15,157	28·8	3·84	685·35	205 60
Mountain Queen	5	Feb. 23, 1914	342	10,735	31·3	3·82	484·18	145 25
Sangster's Mayflower	7	Sept. 23, 1913	495	13,301	26·8	3·68	575·88	172 76
Arthur's Princess	5	Nov. 24, 1912	522	13,799	26·4	3·18	516·25	154 87
Surprise	6	Dec. 24, 1913	377	11,892	31·5	3·33	467·28	140 18
Average, 5 best	6		452	12,976	28·9	3·57	545·76	163 73

GUERNSEYS.

Name of Cow.	Age	Date of Dropping Calf.	Days	Milk, Lb.	Daily Avg., Lb.	Fat, p. c.	Butter, Lb.	Value, $ cts.
Ottawa Itchen	8	Nov. 16, 1913	361	8,544	23·6	5·43	546·28	163 88
Ottawa Deanie	4	Nov. 25, 1913	345	7,352	21·3	5·85	506·70	152 01
Itchen's Girl	4	Oct. 14, 1913	328	7,099	21·6	5·52	461·57	138 47
Ottawa Itchen's Favour	5	Feb. 4, 1914	391	7,320	18·7	5·40	465·37	139 61
Archer's Pearl	4	Oct. 20, 1913	336	6,002	17·8	5·59	395·17	118 55
Average, 5 best	5		352	7,263	20·6	5·55	475·01	142 50

OTTAWA.

AYRSHIRES.

Value of Skim Milk at 20c. per cwt.	Total Value of Product.	Amount of Meal Eaten, at 1¼c. per pound.	Amount of Roots and Ensilage eaten, at $2 per ton.	Amount of Hay eaten, at $7 per ton.	Amount of Green Feed eaten, at $3 per ton.	Amount of Straw eaten, at 20c. per cwt.	Months on Pasture, at $1 per month.	Total Cost of Feed between Calvings.	Cost to Produce 100 pounds Milk.	Cost to Produce 1 pound Butter.	Profit on 1 pound Butter (skim-milk neglected)	Profit on Cow between calvings (labour and calf neglected).
$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	Cts.	Cts.	Cts.	$ cts.
18 51	164 99	4,534	8,790	3,037	6,450	259	2	88 26	91·2	18·0	12·0	76 73
17 42	155 86	4,419	8,195	2,888	4,000	178	1	80 87	88·8	17·5	12·5	74 99
15 77	128 63	4,194	6,000	3,130	4,000	274	1	76 91	93·7	20·4	9·6	51 72
14 10	116 84	3,850	4,675	2,878	4,000	274	1	70 40	95·8	20·5	9·5	46 44
12 27	110 45	3,204	8,140	3,516	4,000	168	1	67 82	105·7	20·7	9·3	42 63
15 61	135 35	4,040	7,160	3,089	4,490	230	1·2	76 85	95·0	19·4	10·6	58 50

CANADIANS.

15 01	162 77	3,304	7,060	2,673	2,450	183	2	63 74	80·3	12·9	17·1	99 03
15 00	163 58	3,696	12,105	2,634	2,450	557	1	73 29	92·4	14·7	15·3	90 29
18 57	171 20	4,167	13,965	3,192	2,450	634	1	83 14	85·5	16·3	13·7	88 06
15 25	141 25	2,998	12,550	2,676	3,720	358	1	66 67	83·5	15·8	14·2	74 58
10 97	103 43	2,257	5,300	1,172	5,100	364	1	47 04	81·6	15·2	14·8	56 39
14 96	148 44	3,284	10,208	2,469	3,234	419	1·2	66 77	84·6	15·0	15·0	81 67

GRADE AYRSHIRES.

20 67	182 29	4,897	13,460	2,352	3,700	352	......	89 15	82·5	16·5	13·5	93 14
19 25	163 20	3,966	12,695	2,088	3,700	352	......	75 81	75·5	15·8	14·2	87 39
20 84	168 29	4,877	15,855	2,808	3,700	352	......	92 88	85·6	18·8	11·2	75 41
18 56	137 37	3,506	13,365	2,148	3,040	577	......	70 40	73·1	17·7	12·3	66 97
12 09	112 08	2,691	6,000	1,275	3,700	....	......	49 64	78·3	14·8	15·2	62 44
18 28	152 64	3,987	12,275	2,134	3,568	408	......	75 57	79·0	16·7	13·3	77 07

GRADE HOLSTEINS.

29 14	234 74	4,900	19,085	2,634	6,740	505	......	100·66	66·4	14·6	15·4	134 08
20 68	165 93	4,118	6,940	1,974	3,700	246	......	71 35	66·4	14·7	15·3	94 58
25 62	198 38	5,820	17,145	3,588	5,380	220	......	110 95	83·4	19·2	10·8	87 43
26 72	181 59	5,245	25,405	3,022	3·040	924	......	107 93	78·2	20·9	9·1	73 66
22 98	163 16	5,249	8,945	3,198	3,700	240	......	91 77	71·1	19·6	10·4	71 39
25 03	188 76	5,066	15,504	2,883	4,512	427	......	96 53	74·3	17·8	12·2	92 23

GUERNSEYS.

16 15	180 03	4,064	8,545	2,892	5,170	298	1	78 80	92·2	14·4	15·6	101 23
13 84	165 85	3,404	7,585	2,853	3,700	178	1	67 01	91·1	13·2	16·8	98 84
13 41	151 88	2,956	6,060	2,487	3,700	56	1	58 37	82·2	12·6	17·4	93 51
13 84	153 45	3,528	6,920	2,919	3,700	240	1	68 26	93·2	14·6	15·4	85 19
11 33	129 88	2,853	6,060	2,487	3,700	56	1	57 08	95·1	14·4	15·6	72 80
13 71	156 21	3,361	7,034	2,727	3,994	165	1	65 90	90·7	13·8	16·2	90 31

OTTAWA.

HOLSTEINS.

Name of Cows.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of Days in Lactation Period.	Total pounds of Milk for Period.	Daily Average Yield of Milk.	Average per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 30c. per Pound.
	Yrs.		Days	Lb.	Lb.	p. c.	Lb.	$ cts.
Beulah Clay 3rd	2	June 23, 1913	361	9,412	26·0	3·42	379·23	113 76
Clothilde Hengerveld Korndyke	3	Sept. 4, 1913	456	5,949	13·0	3·85	269·54	80 86
Average, 2 cows	2·5		408	7,680	19·5	3·63	324·38	97 31

JERSEYS.

Name of Cows.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of Days in Lactation Period.	Total pounds of Milk for Period.	Daily Average Yield of Milk.	Average per cent Fat in Milk.	Pounds of Butter produced in Period.	Value of Butter at 30c. per Pound.
Brampton Oakland's Trial	3	Nov. 10, 1913	417	9,674	23·1	6·72	765·35	229 60
Brampton Blue Duchess	4	Nov. 20, 1913	376	9,726	25·8	5·41	619·42	185 82
Brampton Sultana Tena (imp.)	4	Sept. 1, 1913	344	6,753	19·6	5·57	442·78	132 83
Brampton Rosa Bonheur	4	Sept. 11, 1913	352	5,841	16·5	5·03	345·76	103 72
Average, 4 cows	4		372	7,998	21·0	5·68	543·32	162 99

OTTAWA.

HOLSTEINS.

Value of Skim-milk at 20c. per cwt.	Total Value of Product.	Amount of Meal eaten, at 1¼c. per pound.	Amount of Roots and Ensilage eaten, at $2 per ton.	Amount of Hay eaten, at $7 per ton.	Amount of Green Feed eaten, at $3 per ton.	Amount of Straw eaten, at 20c. per cwt.	Months on Pasture, at $1 per month.	Total Cost of Feed between Calvings.	Cost to produce 100 pounds Milk.	Cost to Produce 1 pound Butter.	Profit on 1 pound Butter (skim-milk neglected).	Profit on Cow between Calvings (labour and calf neglected).
$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	Cts.	Cts.	Cts.	$ cts.
18 17	131 93	3,652	6,395	2,838	3,450	176	2	69 49	73·8	18·3	11·7	62 44
11 43	92 29	3,424	8,525	3,318	4,000	150	1	70 23	118 0	26·0	4·0	22 06
14 80	112 11	3,538	7,460	3,078	3,725	163	1·5	69 86	95·9	22·1	7·8	42 25

JERSEYS.

18 04	247 64	4,209	8,360	3,039	3,700	302	1	78 75	81·4	10·2	19·8	168 89
18 30	204 21	4,186	7,585	2,853	3,700	178	1	76 78	78·9	12·3	17·7	127 43
12·75	145 58	3,031	5,860	2,283	3,700	56	1	58 39	86·4	13·1	16·9	87 19
11 09	114 81	2,868	5,855	2,379	3,700	56	1	56 68	97·0	16·3	13·7	58 13
15 06	178 06	3,573	6,915	2,633	3,700	148	1	67 65	85 9	13·0	17·0	110 41

CO-OPERATIVE MILK RECORDS.

During the past year an increasing number of applications were received for milk and feed record forms—which are distributed free of charge upon application to this Division. This is a gratifying indication of the rapidly improving methods being adopted by the dairy farmers in keeping records for the individual cows of their herds. Apparently, however, there are still many farmers who are not aware of this free distribution of record forms. The following is a list of the forms for distribution:—

Month long.—Daily milk records suitable for herds numbering up to twenty-two cows.

Week long.—Daily milk records suitable for herds numbering up to sixteen cows.

Week long.—Daily milk records suitable for herds numbering up to twenty-four cows.

Monthly summary records.

Yearly summary records.

Feed record forms.

It should be clearly understood that the object of this free distribution is not in any way to overlap the work of the Cow Testing Associations of the Dairy and Cold Storage Branch, Department of Agriculture; but rather to encourage individual farmers, especially in districts where cow testing associations are not developed, so that these individuals may in turn eventually form the nucleus of record centres.

DISPOSAL OF MILK.

As previously reported, milk produced on the Central Experimental Farm during the past three years has been marketed as certified milk, butter, cream cheese, Coulommier cheese, Cheddar cheese, and only a very limited quantity of milk and cream sold to farm employees who had not the facilities of the city distribution. No new phases of experimental manufacturing or marketing of cheese have been tried during the past year. Complete details of the success of the above-mentioned methods may be found in previous annual reports. It is sufficient to say that the demand for all manufactured products has increased very rapidly, and that the returns on the milk continue to be very satisfactory to the dairy. Milk marketed in these various ways nets from $1.60 to $3 per hundred pounds. Pamphlets on the question of the manufacture of these products may be obtained upon application to this Division.

NEW DAIRY CATTLE BARNS.

CENTRAL EXPERIMENTAL FARM.

The accompanying plans and photographs of these barns are for the most part self-explanatory. Nevertheless a few brief specifications may help to make these illustrations more intelligible and explain their purposes.

These buildings were erected on the same site and as a replacement of the somewhat similar structures destroyed by fire on October 11, 1913. The work of clearing away the débris was commenced immediately after the fire, and the exterior of the two wings and the foundation of the main barn completed before the end of that calendar year. These buildings were completed and thoroughly equipped during the fall of 1914.

OTTAWA.

This Division, under the supervision of the Director, planned the details of this building and, to a certain extent, supervised the construction. Special credit is due Mr. J. B. Ker, the farm foreman carpenter, not only for a great deal of assistance in the planning of these barns, but also for the direct laying out and supervising of all carpenter and stone-mason work. Great credit is also due to the farm foreman, Mr. D. D. Gray, for the thoroughness with which he hastened the clearing away of the débris and supplied men and materials for the laying of all concrete work.

The purpose of these buildings is for the housing of the five pure-bred dairy herds on this Farm, and the conducting of experimental breeding and feeding work with such animals. These structures are thus special-purpose barns, and would not be recommended in their general layout and all details as commercial barns. The extra size and the extra storage capacity, the placing of cattle rows to conduct the best tests of breeds and feeds, and all such special outlay and equipment, would be unnecessary in a farmer's barn. Nevertheless the details of the structure and the finish of same illustrate the most modern and economical types of farm buildings, and such may be well applied to any practical farmer's barn.

Special attention is being given to the comparison of the most modern types of fittings, floor finish, stall floors, water basins, milking machines, and all such details, which assist in sanitation, comfort, economy, and efficiency in handling dairy cattle. It is hoped that, in the course of two years, complete and correct data regarding all such will be available for distribution.

It is a self-evident fact that much of the modern cow barn equipment is not only an extravagance but is a useless expenditure, as many fittings are neither of economic or permanent efficiency, nor do they tend toward the most sanitary conditions. All the details of the structure of these barns have been made with the purpose of illustrating simplicity, economy, and durability of construction, and of the natural result thereof, namely, the greatest economy in maintaining the most sanitary conditions.

Permanency is a point often overlooked by farmers anticipating the remodelling of old or the building of new farm structures. This lack of foresight is often excused on the grounds of heavy expenditure. If the farmer will but make definite plans of the location and buildings required and, based on such plans, do from year to year as much as possible to complete permanent buildings, it would save the heavy interest on such buildings were they completed in a short time, and would also save many subsequent changes and remodellings.

The Main Dairy Barn.

The main barn is of the "bank barn" type, but set sufficiently high to allow good-sized windows on the bank side. The basement accommodates eighty-eight cows and heifers tied in stands, and also all the necessary feed, motor, milk, and wash rooms for the main barn and the two wings. The two wings provide accommodation for bulls and calves, together with all necessary box stalls, hospital, etc. An annex to the main barn joins the feed room to the silos and provides ample room for the dumping of ensilage and mixing the same with cut hay or straw.

SUPERSTRUCTURE.

The foundation of the main barn is of stone, with a cut, shoddy facing. This gives a very pleasing appearance to the barn and makes a very strong wall at a fairly reasonable cost.

The superstructure above the foundation is of wood. This is a plank frame type of barn with a square pitch roof. All the frame was made from 2 by 8, 2 by 10, and 2 by 12 planking. The only steel used in this superstructure was the 12-inch I-beams for the two main lines of girts through the barn, and the 7-inch round iron posts supporting this line of steel girts. All the joists, posts in the storage barn above, and all other framework were of made timbers, as given in the plans.

Special attention is drawn to the roofing of this barn. As other materials for roofing have been tried on other barns previously reported on, it was decided to use "Asbestoslate" shingles for a comparison with wood, metal, and other prepared roofings. To date, this "Asbestoslate" shingle has appeared very efficient and promises durability. This shingle is cheaply laid, is spark-proof from without, and has a smothering effect on fire within the barn, hence should add considerably to the fire protection of the live-stock buildings.

THE COW STABLE FLOORS.

All the main floors in the main barn and wings, feed rooms, milk rooms, and power rooms are of concrete. These floors were laid with a 4-inch rough coat of 1, 2 and 4 composition, and finished with a surface coat 1½ inch thick of 1 to 3 composition. All the passageways, and particularly the manure passages, were given a smooth finish and then heavily rolled with a cement roller to give the dented finish, to prevent the animals from slipping. All sharp grades, particularly the passageways leading to the barn, were deeply cross-lined at every 5 inches, and also rolled.

CATTLE STANDS.

Attention is drawn to the different materials used in the cattle stands. Two patented floorings were tried, namely, the "Dutch Flooring," which shows a surface somewhat similar to cement, and the "Kent Cork Brick." Aside from these two floors for the cattle stands, concrete floors laid in two different ways were also tried. Provision was also made for the testing out of straw mats under the fore-feet of the cattle, in order to save and add to the comfort of the animals. In this way five different types of flooring will be tested out.

MANGERS.

The mangers in the cattle barn are of two types. Six mangers are so constructed with the elevated feed passage that the top of the manger is the edge of the feed passage. This is a very cheap and efficient type of manger, and one which cuts down the labour of feeding to a minimum. Two other mangers were constructed with a 10-inch curbing forming the front of the manger. This is proving fairly satisfactory, the great difficulty being that the animals throwing feed over the front of the manger can still see the same and are inclined to reach, with the possible danger of slipping. All mangers were given a very smooth finish.

MANURE GUTTERS.

The manure gutters were constructed in the usual style, namely, 18 inches in width, 7½ inches in depth next the cattle stand, 6 inches in depth next the manure passage, and with a ½-inch fall in bottom from the stand toward the passage. Aside from this, the manure gutters were graded from one end to the other.

LEVELS.

The main passage running lengthwise of the barn is 5½ inches above the manure passage and 5½ inches below the feed passage. The rear of the cattle stand is 2 inches higher than the manure passage. The manger bottoms are 1½ inches higher than the fronts of the stands. The divisions between the mangers and the stands are of concrete, same being 7 inches higher than the front of the stands and 5½ inches above the manger bottom. The levels of the floors of the feed room, the two end passages of the barn, the motor rooms, and the main passage of the two wings to this barn are all the same as the lengthwise passage of the main barn.

OTTAWA.

SLOPES.

The cattle stands have a slope of 1½ inch from front to rear, excepting type 3 stand, which has a depression at the fore-feet, 2 feet from the manger curbing, and then a fall of 1 inch to the rear of stand. The feed passages and manure passages have a crown of 1 inch to centre. The bottom of the gutter is 1½ inch higher next the cattle stand than next the manure passage. The mangers and the gutters have a slope of 2 inches from one end to the other, and with facilities for thorough drainage. The main passage has a slope of 1 inch toward the ends of feed passages and manure passages. These slopes facilitate the cleaning of the barn and allow a perfect drainage towards the ends of mangers and gutters from all parts of the floor of the barn. The floors of the milk room, wash room, feed room and silo room are all graded toward floor traps, thus allowing thorough washing and the greatest cleanliness.

CATTLE STALLS.

Four makes of cattle stalls and stanchions were tried in pairs of rows. The makers of these steel stalls and stanchions, with their addresses, are as follows: Beatty Bros., Fergus, Ont.; Canadian Potato Machinery Co.; Galt, Ont.; Louden Machinery Co., Guelph, Ont.; Superior Barn Equipment Co., Fergus, Ont. All these stalls and stanchions to date have been fairly satisfactory. Further details regarding their comparative values will be available for distribution in the course of another year. The specifications for all these different makes called for a stall as simple and strong as possible. A single post between the heads of the cattle, a single head-rail, and a single curved division between the cows, with the necessary stanchion and attachments, make a stall which is comparatively cheap and is fully as efficient as a more elaborate type.

DRAINAGE.

A main drain 8 inches in diameter runs the full length of the barn toward the farm sewer. Into this drain drop the 4-inch drains from the ends of the gutters and mangers. In order to prevent materials getting into these 4-inch drains which would clog the same, a plug was fitted in the mouth of the drains, bored in the centre for a 2-inch screw plug; hence only small bits of refuse which would float through a 2-inch hole have access to the main drains or the branches. The floor drains of all the rooms elsewhere specified also drop into the 8-inch main drain. All such floor drains are supplied with traps to prevent the return of sewage gas.

WATER.

Four different makes of water bowl were tested in the cattle rows. The makers of these are as follows: Beatty Bros., Fergus, Ont., two types; Canadian Potato Machinery Co., Galt, Ont., one type; Gould, Shapley and Muir Co., Brantford, Ont., one type.

Water at tap is also available in the wash room and in other parts of the barn where needed.

WALLS AND CEILINGS.

Over the stone walls an inside jacketing of sheathing, leaving a 2-inch air space, insulates perfectly. The underside of the joists is also sheathed with V-joint, thus giving good insulation in the ceiling.

LIGHT.

As much light as the strength of the walls would permit was installed in this barn. The windows in the walls and doors are as large as possible. This main barn accommo-

dates eighty-eight head and has a lighting capacity of $10\frac{1}{2}$ square feet of glass per head. Direct sunlight reaches almost every part of this barn, which renders it very sanitary, bright, and cheerful.

VENTILATION.

A modified Rutherford system of ventilation is used in this barn. Owing to the peculiar location, all the fresh-air intakes are brought in at the north and east sides of the barn. These are carried under the flooring from the main ducts through individual ducts to the intakes next the wall. These intakes are each 8 inches wide and 32 inches long. Allowing for the difference between a direct intake system and this more indirect intake system in the loss of flow of fresh air by friction, there are provided 16 square inches of intake per head.

The foul-air outlets, three in number, each 2 by 4 feet inside measurement, allow nearly 38 square inches of outlet per cow. This is rather more than is necessary, but is readily controlled. These foul-air outlets are not placed in the centre of the building, but somewhat to one side of the centre in order to allow a clear centre barn floor in the centre of the superstructure. These outlets run vertically to the line of rafters, following the same to the peak, where they are capped by cupolas. These foul-air outlets are constructed in the usual way, namely, two ply of inch matched lumber with a 1-inch air space and 1 ply of paper between. This makes a perfect foul-air outlet and one which allows no condensation and dripping.

The fresh-air intakes in the outside ventilator hood have control dampers. The foul-air outlets also have control dampers in the form of keys, with cords attached for their manipulation.

The windows of this barn are two sashes, the upper one of which is hinged to the lower sash, opening inward from the top. These have a special spiral control, which is very cheap and efficient. By the tilting of these upper sashes at any angle by means of control cords, more fresh air than is admitted through the fresh-air intakes may be allowed when warm weather necessitates. Screens, both for the windows and the door sashes, are supplied, which allow added ventilation during the warm summer months, as well as preventing the entrance of flies. Storm sashes are provided for all windows in order to control the temperature and the ventilation better during the winter months.

MILK AND WASH ROOMS.

By a small amount of excavation underneath the driveway, two very commodious rooms for sinks and lockers and for the weighing of milk were provided. The walls of these rooms were plastered with cement, allowing a 2-inch air space around the sides in order to ensure insulation. The ceiling of these rooms was lined with V-joint, and an air space above, providing good insulation. These two rooms are simply but efficiently equipped and are proving very satisfactory.

FEED-ROOM.

The feed-room facilities of this barn are now excellent. A trap door in the ceiling allows the entrance of the pulped roots in a very convenient spot. A dust-proof chute allows the entrance of either cut straw or cut hay from the storage barn above. Meal chutes from bins in the storage barn are also conveniently arranged. A set of flush floor scales allows the weighing of all feeds leaving the feed room for the various parts of the barn. Into this room also enters the ensilage from the small silo room attached thereto. With this simple arrangement a thorough control of all foodstuffs may be maintained.

OTTAWA.

MOTOR ROOM.

A small but convenient motor room is situated in the southwest corner of the main barn. This room is practically fireproof, as the walls, ceiling, and floor are of concrete. In this room is placed a 25-horsepower motor for the driving of a counter-shaft in the main storage barn, thus performing all pulping, grinding, thrashing, straw cutting, and the like. This motor also drives a short counter-shaft running out between the two silos, thus providing power for the cutting of the corn for silage.

A small motor for the driving of the pumps of the various makes of milking machines is also situated in this room, together with the pumps and vacuum tanks of these machines. This change of power from gasolene to electricity in the main barn is proving very satisfactory, both in the form of cheaper power and also less waste of labour and greater general efficiency. From a fire-protection standpoint this new system should be very efficient.

MILKING MACHINES.

Two types of milking machines were installed in this barn. These two types are the Sharples mechanical milker and the Burrell-Lawrence-Kennedy milking machine. Two other makes of milkers were also recently installed, but operated in conjunction with the Burrell-Lawrence-Kennedy pump and vacuum pipes. These are the Lister and the Empire mechanical milkers. Further reference is made to these machines elsewhere in this report.

SILOS.

As different makes and types of silos were being tried elsewhere on the Central Experimental Farm it was deemed advisable to try two fireproof silos. After careful consideration it was decided to erect one home-made reinforced hollow cement block silo and one vitrified clay tile silo manufactured by the National Fire Proofing Co., of Hamilton, Ont. These two silos are 22 feet inside diameter and 38 feet inside height. This latter dimension includes a 6-foot solid cement foundation wall 16 inches in thickness. Both silos are well reinforced with iron rods or bands, and have remained in perfect condition during the nine months since their construction. It is rather too soon to make any comparisons either between these silos or the various makes of wood silos at the other barns; however, it can be said that, for the past winter at least, both silos were very efficient in preventing freezing to any great extent, and in the preservation of a first quality of ensilage.

MISCELLANEOUS.

The manure is wheeled from the barn in wheelbarrows, and dropped in the yard, where it is each day hauled to the field. For this particular type of barn, and in this location, this is considered probably the most economical method of handling the manure.

No root storage is provided in this barn, as ample storage room is available elsewhere on the Farm. The roots are hauled as needed to the pulper on the barn floor.

Different types of dustproof hay and straw chutes are being tried in this barn, all of which add materially to the ease in maintaining a sanitary barn with the least possible amount of labour expended.

CALF BARN.

The east wing from the main barn is specially fitted for calves. This is a two-story building, but not of the "bank barn" type. The details of this building are so similar to the main barn, and where dissimilar are so clearly shown in either the plans or photographs that few explanatory notes are needed.

ACCOMMODATION

This barn contains seventeen calf pens and two maternity stalls. If filled with calves, this barn will accommodate upwards of seventy head of calves of ages ranging from birth to 14 months.

FLOORS.

The main passage and the most of the pens are floored with concrete. The pens have a depression of 3 inches below the edge of the passage, the passageway having a crown of 1 inch to the centre. Two other types of flooring for the calf pens were also tried, namely, the "Dutch Flooring" and the "Kent Cork Brick."

MANGERS.

The mangers were also made of concrete, the bottoms of the mangers being 1 inch above the passage level

CALF PENS.

It was deemed advisable to put tight divisions between the calf pens, not only to prevent draughts, but also to prevent any contagious trouble, such as contagious scours, from travelling through the barn. The pen fronts, however, were chosen of the steel stanchion front type. These are proving very satisfactory to date. Guard-rails were placed in front of the stall fronts in order to keep visitors from bothering the calves while eating. This equipment was supplied by the Superior Barn Equipment Co., of Fergus, Ont.

CONVENIENCES.

Water is supplied to each calf pen in a large "B-T" water basin.

The ventilation of this barn is of the Rutherford system, similar to the main barn.

A set of flush floor scales inserted in the end of the passageway allows for the weighing of calves on feeding experiments, also for the weighing of foodstuffs.

This calf barn is simple, convenient, and very sanitary. To date, calves have been as a rule, more healthy than ever before, due quite largely to the new quarters.

BULL BARN.

The west wing to the main barn is also a two-story barn, but not of the "bank barn" type. The superstructure of this barn is exactly the same as of the calf barn. The conveniences and general arrangements, too, are quite similar, hence but few detailed notes are necessary.

Only one row of bull pens was installed in this barn, the feed passage being against the east wall. The floor of the bull pens is 10 inches lower than the passage and although not showing the animals, perhaps, to best advantage, yet the pens are much safer and the feed passage very much cleaner. Each bull pen has a doorway leading to a bull yard on the west side of this barn. This yard, tightly constructed, allows for the exercising of the bulls, either loose or on a cable.

At the south end of this barn is a commodious hospital sufficiently large to accommodate six head.

No water is supplied in basins to the bulls, but all other conveniences are given, to facilitate economy in feeding, comfort, and sanitary conditions for the animals.

OTTAWA.

FINANCIAL STATEMENT FOR DAIRY CATTLE.

Below are submitted inventories and returns for dairy cattle on the Central Experimental Farm for the year April 1, 1914, to March 31, 1915.

	April 1, 1914.		March 31, 1915.		Returns, including sales of dairy produce, breeding cattle, and bull service.	Gross returns, including increased values and sales.
	No.	Value.	No.	Value.		
		$		$	$	$
Dairy cattle...........	140	24,275 00	159	27,570 00	13,769 64	18,264 64

Returns.

By increased value of herds..	$ 3,295 00	
Returns from dairy products..	11,526 55	
Returns from sales of cattle..	2,221 09	
Returns from bull service..	22 00	
Returns from manure, 1,200 tons at $1..	1,200 00	
Gross returns..		$ 18,264 64

Expenditures.

To value of foodstuffs consumed..	$ 9,136 14	
Cost of labour..	5,156 63	
Cost of new stock purchased..	2,505 00	
Gross expenditures..		$ 16,797 77
Net balance from dairy cattle..		$ 1,466 87

OTTAWA.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

DAIRY COW.

One grade Guernsey cow was kept to supply milk for the men. She calved June 8, and after recovering from an attack of milk fever, produced 6,646 pounds of milk in ten months. Her profit over the year's expenses was $63.09. She was milking well at the close of the fiscal year, when she was sold to make room for two purebred Ayrshire cows, "Island Queen of Spruce Row" and "Lady Petunia of Spruce Row." These promising young cows are the beginning of an Ayrshire herd for this Station.

The following data were recorded:—

Number of days milking		293
Number of pounds of milk (9½ months)	Lb.	6,421
Amount of hay fed, counted for one year	"	1,811
Amount of oats fed counted for one year	"	1,621
Amount of bran fed, counted for one year	"	1,816
Amount of roots fed, counted for one year	"	10,540
Pasture, 5½ months at $1 per month	$	5 50
Cost of feed	"	65 34
Value of milk, 2,568·5 quarts at 5 cents per quart	"	128 43
Balance	"	63 09

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

DAIRY CATTLE GRADING EXPERIMENT.

OBJECT OF EXPERIMENT.

The object of this experiment is to discover the actual cash value of the pure-bred dairy sire in the herd of common and mixed breeding, in the increased production of progeny, as well as the proportionately greater market value. The outline for this experiment will be found in the annual report for the year ending March 31, 1913.

The results of the experiment to date, April 1, 1915, have been most encouraging. A good percentage of heifer calves has been dropped. Twelve heifers, termed "foundation heifers," have dropped their first lot of calves from the Ayrshire cross, Holstein cross, and Guernsey cross; also second crop from the Ayrshire cross, yielding four heifers, and have completed their first three lactation periods.

The first crop of calves (first cross Ayrshire), of which there are eight, born in the fall of 1911, have dropped their first and second crops of calves (second cross Ayrshire), yielding in the fall of 1913 five heifers, and in the fall of 1914 five heifers. These in turn will be bred to freshen at 24 months of age. They, with their dams, will always be bred to a pure-bred Ayrshire bull from a good milking strain. The eight first cross Ayrshire heifers have just completed their first lactation period.

The second crop of calves from foundation cows (first cross Holsteins), of which there were six dropped in the fall of 1912, have dropped their first crop (second cross Holstein), yielding three heifers, which in turn will be bred to freshen at 24 months of age. They, with their dams, will always be bred to a pure-bred Holstein bull from a good milking strain.

The third crop of calves from foundation cows (first cross Guernsey), calved in the fall of 1913, of which there are three, will freshen in the fall of 1915.

While the experiment is yet young, so to speak, there is, however, a marked improvement in the greater percentage of the progeny, in that they are promising to be superior to their dams. This is most striking in the percentage of fat in milk. In almost every case the progeny have given a higher test than their dams.

The following table will give the results of the third year's work in milk production of the foundation cows, also the first year's work in milk production of the first cross Ayrshire heifers.

RECORDS OF

Name.	Date of Dropping Calf.	Number of days in Lactation Period.	Total Pounds of Milk for Period.	Daily Average Yield of Milk.	Average per cent Fat in Milk.	Pounds of Butter Produced in Period.
		Dys.	lb.	lb.	p. c.	lb.
Maggie	April 10, 1914	283	6,666·2	23·55	4·0	319·54
Vera	Dec. 21, 1913	299	6,840·6	22·87	3·6	293·16
Mossy	Dec. 27, 1913	302	4,885·6	16·17	4·8	280·09
Jean	April 8, 1914	251	5,961·2	23·75	3·9	273·54
Jessie	Feb. 3, 1914	264	5,149·3	19·50	4·2	252·52
Bell	Jan. 26, 1914	315	7,253·8	23·04	4·0	344·15
Queen	Jan. 7, 1914	292	6,111·3	20·92	4·3	314·95
Ella	Dec. 17, 1913	355	6,771·4	19·07	4·0	325·17
Myrtle	Jan. 17, 1914	219	5,066·2	23·13	3·7	225·87
Georgie	Feb. 25, 1914	285	4,097·6	14·37	3·9	189·96

FIRST CROSS

Mossy 1A	Dec. 27, 1913	292	3,309·5	11·30	4·8	187·63
Jean 1A	Feb. 22, 1914	293	5,013·7	17·11	4·0	238·69
Jessie 1A	Nov. 14, 1913	341	4,278·5	12·54	4·8	239·43
Queen 1A	Dec. 6, 1913	310	4,037·6	13·02	4·7	223·70
Ella 1A	Feb. 25, 1914	306	4,641	15·16	4·3	235·74
Myrtle 1A	Nov. 11, 1913	350	2,060	5·88	4·1	99·70
Spot 1A	Jan. 11, 1914	266	4,244·6	15·95	4·5	227·47
Lessie 1A	Jan. 7, 1914	266	3,885	14·60	4·0	183·97

NAPPAN.

DAIRY HERD.

Value of Butter at 30c. per pound.	Value of Skim-milk at 20 cents per hundred-weight.	Total value of Product.	Amount of Meal eaten, at 1¼ cents per pound.	Amount of Roots and Ensilage eaten, at $2 per ton.	Amount of Hay eaten at $7 per ton.	Amount of Green Feed at $3 per ton.	Months on Pasture, at $1 per month.	Total Cost of Feed for Period.	Cost to Produce 100 pounds Milk.	Cost to Produce 1 pound Butter (Skim-milk neglected).	Profit on 1 pound Butter (Skim-milk neglected).	Profit on Cow during Period, Labour and Calf negelcted.
$ cts.	$ cts.	$ cts.	lb.	lb.	lb.	lb.	Mos.	$ cts.	$ cts.	cts.	cts.	$ cts.
95 86	12 79	108 65	1,623	7,760	3,977½	3,499	4⅔	51 87	0 77	16·23	13·77	56 78
86 95	13 18	101 13	2,165	9,440	3,607½	3,499	4⅔	59 03	0 86	20·13	9·87	42 10
84 03	9 03	93 06	1,771	9,760	3,727½	3,499	4⅔	54 85	1 12	19·58	10·42	38 21
82 06	11 46	93 52	1,431	8,240	3,157½	3,499	4⅔	47 09	0 78	17·21	12·79	46 43
75 76	9 87	85 63	1,710	10,120	3,862½	3,499	4⅔	54 89	1 06	21·73	8·27	30 74
103 28	13 93	117 21	2,129	10,240	3,892½	3,499	4⅔	60 34	0 83	17·81	12·19	56 87
94 48	11 68	106 16	2,002	9,000	3,442½	3,499	4⅔	55 99	0 91	17·77	12·23	50 17
97 55	12 99	110 54	2,323	13,440	5,117½	3,499	4⅔	70 30	1 03	21·63	8·37	40 24
67 76	9 75	77 51	1,810	10,600	4,042½	3,499	4⅔	57 28	1 12	25·35	4·65	20 23
56 99	7 87	64 86	1,336	8,880	3,397½	3,499	4⅔	47 37	1 15	24·93	5·07	17 49
AYRSHIRE.												
56 29	6 28	62 57	1,255	8,980	3,397½	3,499	4⅔	46 46	1 40	24·76	5·24	16 11
71 61	9 62	81 23	1,530	8,120	3,112½	3,499	4⅔	48 04	0 95	20·12	9·88	33 19
71 83	8 15	79 98	1,735	12,600	4,792½	3,499	4⅔	60 97	1 42	25·46	4·54	19 01
67 13	7 69	74 82	1,454	9,600	3,667½	3,499	4⅔	50 52	1 25	22·53	7·43	24 30
70 72	8 88	79 60	1,566	9,480	3,622½	3,499	4⅔	51 64	1 11	21·90	8·10	27 97
29 93	3 95	33 88	1,319	14,420	5,407½	3,499	4⅔	59 56	2 88	59·70	−29·70	−25 68
68 24	8 10	76 34	1,466	8,960	3,427½	3,499	4⅔	49 19	1 15	21·62	8·38	27 15
55 19	7 46	62 56	1,404	8,480	3,247½	3,499	4⅔	47 30	1 21	25·71	4·20	15 35

NAPPAN.

DATA *re* Cost of second cross Ayrshire heifers and first cross Guernsey heifers from birth to 1 year of age.

Name.	Period.	Whole Milk.	Skim-milk.	Meal	Roots or Ensilage.	Hay.	Green Feed.	Molasses.	Total Cost.
		Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	$ cts.
Myrtle 1 A 1	Nov. 11, 1913, to Nov. 11, 1914	560	2,800	468	2,696	914	1,320	124	28 93
Jessie 1 A 1	Nov. 14, 1913, to Nov. 14, 1914	560	2,740	477	2,786	923	1,320	124	29 17
Queen 1 A 1	Dec. 6, 1913, to Dec. 6, 1914	510	2,900	535½	3,610	999	1,320	124	30 22
Lessie 1 A 1	Jan. 7, 1914, to Jan. 7, 1915	520	2,260	631	4,570	1,089	1,320	124	33 04
Jean 1 A 1	Feb. 22, 1914, to Feb. 22, 1915	540	2,000	644	5,450	1,227	1,320	124	35 02
Ella 1 G	Dec. 17, 1913, to Dec. 17, 1914	520	2,600	573¾	3,880	1,032	1,320	124	31 33
Queen 1 G	Jan. 1, 1914, to Jan. 1, 1915	520	2,400	615	4,390	1,071	1,320	124	32 58
Jean 1 G	April 8, 1914, to April 8, 1915	620	1,800	600	5,950	874	1,320	124	35 01

Note that the average cost to raise the six first-cross Holstein heifer calves from birth to 1 year of age during 1913-14 was $30.36 per head; that the average cost to raise the five second-cross Ayrshire calves from birth to 1 year of age during 1914-15 was $31.28 per head; and that the average cost to raise the three first-cross Guernsey heifer calves from birth to 1 year of age during 1914-15 was $32.97 per head. The slightly higher cost in the last two instances is no doubt due a great deal to the higher cost of feed this year.

NAPPAN.

DATA *re* cost of Holstein heifers from the time they were yearlings until they dropped their first calf.

Name.	Period.	Meal.	Roots or Ensilage.	Hay.	Pasture.	Total Cost.
		Lb.	Lb.	Lb.	Days.	$ cts.
Mossy 1 H.......	Dec. 6, 1913, to March 15, 1915.	723	9,820	4,365	85	40 92
Vera 1 H.........	Dec. 27, 1913, to April 19, 1915.	730	9,830	4,755	85	42 60
Jessie 1 H........	Dec. 19, 1913, to Feb. 6, 1915.	600	8,100	3,770	85	34 98
Spot 1 H.........	Jan. 14, 1914, to April 25, 1915.	660	9,630	4,750	85	41 33
Bell 1 H.........	Jan. 24, 1914, to Jan. 28, 1915.	476	6,600	3,235	85	29 48
Myrtle 1 H......	Feb. 1, 1914, to March 21, 1915.	564	8,040	3,960	85	35 14

Note that the average cost to raise the eight first-cross Ayrshire heifers from yearlings until they dropped their first calf during 1913-14 was $34.25 per head; and that the average cost to raise the six first-cross Holstein heifers from yearlings until they dropped their first calf during 1914-15 was $37.41 per head. The high cost of production in the latter case is doubtless partly due to the high cost of feed and partly due to individuality.

NAPPAN.

EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. S. BI R.

SHORTHORN CATTLE.

As reported last year, the herd at this Station is entirely Shorthorn of Scotch foundation blood, which were selected as representing a good type of farmer's Shorthorns, showing indications of fair milk production, combined with good beef conformation. The herd is not of the dairy Shorthorn breeding, but will be considered from the dairy standpoint. A Shorthorn bull from a good milking strain, but with good beef points, heads the herd, the object being to produce a good beef type of Shorthorn which will give a reasonable flow of milk.

It will be seen from the tabulated data given below that some of the cows compare favourably with good individuals in the milking breeds from a dairy standpoint, and the fact that some of the cows are not profitable milk-producers will give an opportunity to determine the influence of the sire in building up a profitable dairy herd with such cows. It might be stated that the cows are bred as soon as possible after calving.

During the year, one yearling bull has been disposed of for breeding purposes. The stock now consists of seven milch cows, four yearling heifers, three heifer calves, and five bull calves and the herd bull, or a total of twenty head.

The milk from each cow is weighed at each milking, and the butter-fat determined from samples taken weekly.

WINTER FEEDING RATION.

The daily winter ration per cow was as follows:—

	Pounds.
Hay	16
Turnips	60
Corn ensilage	50
Meal mixture 1 pound to 3 pounds milk produced.	

The meal mixture was made up of and cost as follows:—

Wheat bran	400	pounds at	$1.27	$ 5 08
Cotton-seed meal	150	"	1.85	2 77
Oilcake meal	100	"	1.90	1 90
Middlings	150	"	1.65	2 47
Crushed oats	200	"	1.50	3 00
Total	1,000			$ 15 22

One pound of salt was put into the above mixture per 100 pounds when ready for mixing. The cows were fed turnips during the first part of the winter period to February 1, and corn ensilage from that time on.

HOW FED.

The roots or ensilage is fed in the morning, immediately after milking, and the grain mixture is fed at the same time by scattering it on the feed. After this is eaten a feed of hay is given. At 4 o'clock in the afternoon the same mixture as given in the

Cattle Barn, Central Experimental Farm, Ottawa. One of the Ayrshire rows. Note cattle ties and the comfort of animals. Also note the light and the over head pipes for milking machines.

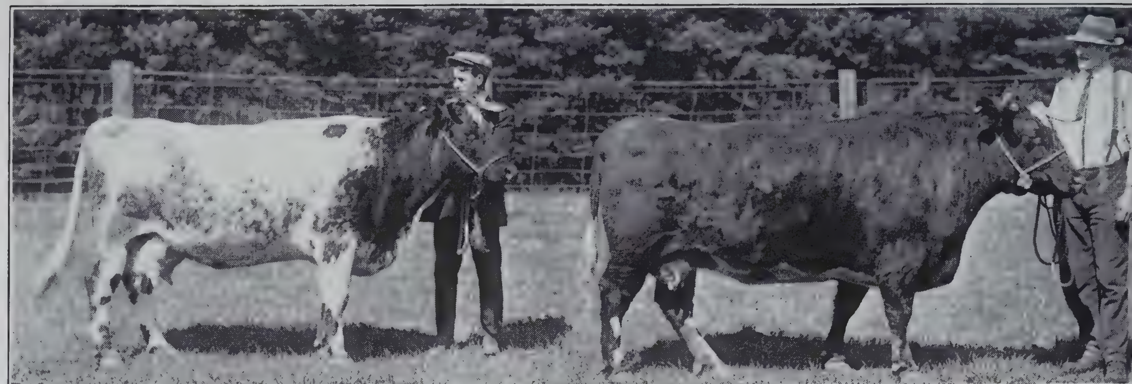
Calf Barn, Central Experimental Farm, Ottawa. Note the open fronts and pens, guard rails, to protect calves; mangers; light and ventilation.

Bull Barn, Central Experimental Farm, Ottawa. Note open fronts to pens and well lighted passage.

Cow Barn, Central Experimental Farm, Ottawa. Main passage. Note the fresh air intakes near wall.

Denis Lord—1539—French Canadian bull at head of herd, Experimental Station, Cap Rouge, P.Q.

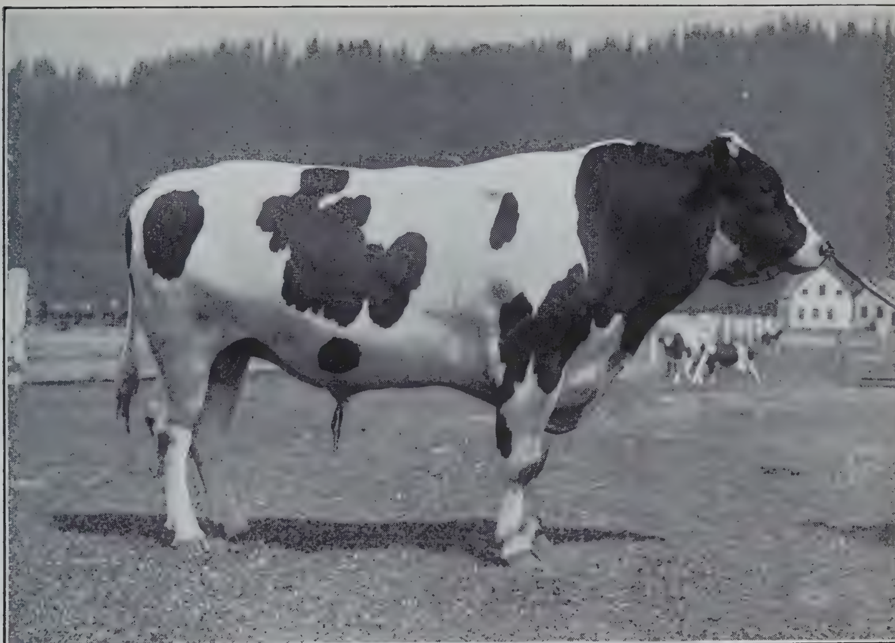
Dairy Type Steers: good feeder on left, poor feeder on right. Experimental Station, Charlottetown, P.E.I.



Brandon : Two Shorthorn cows, illustrating Dual-purpose and Beef type. The one on the left produced in one milking period 12,800 lbs. of milk at a profit of $97.75 ; during the same time the one on the right produced 4,145 lbs. of milk at a loss of $11.55. (The value of the calf and the manure and the cost of labor are not counted in either case.)

Brandon : Group of Dual-Purpose Shorthorns, headed by Butterfly King 21st. Each of the four cows has given over 9,500 lbs. of milk in 12 months.

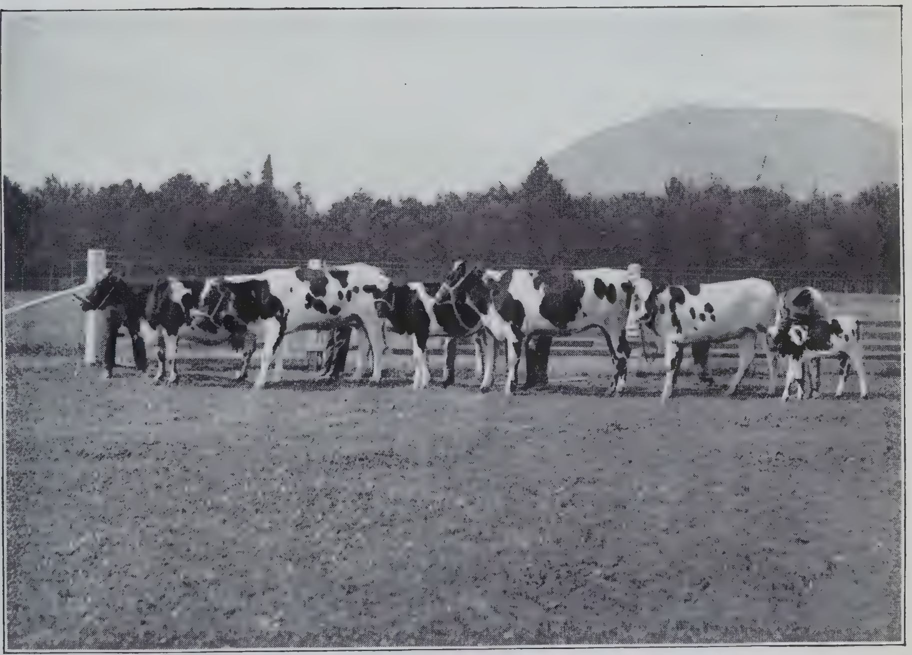
Dairy herd at pasture. Lacombe, Alta.



Agassiz, B.C. Sir Natoye Korndyke—13540—Herd Bull. At 3 years 10 months of age weighs 2414 lbs.

Agassiz, B.C. B. C. Korndyke choice—18994—junior herd bull. At 15 months of age weighs 1240 lbs.

Agassiz, B.C. No. 17.—One of the best foundation grade cows.



Agassiz, B.C. Cow No. 22 and her progeny since 1912.
From left to right: No. 22; Daughter No. 35; (Daughter No. 64); No. 55; No. 63; No. 76.

Agassiz, B.C. Cow No. 16 and her female progeny, since 1912.
From left to right : No. 16, Daughter No. 31 grand-daughter No. 59, No. 55, No. 73.

Agassiz, B.C. Cow No. 1 and her progeny since 1912.
Left—Cow No. 14, Daughter No. 36, Grand-daughter No. 71, Daughters Nos. 47 and 67.

morning is repeated, the hay being given after the milking is done. Water is before the cattle all the time. The roots are pulped before feeding.

The dry cows are fed 5 pounds of grain per day for several weeks before freshening. The grain ration consists of 300 pounds bran, 200 pounds oil-meal, 100 pounds ground oats.

SUMMER FEEDING.

The pasturage is limited and not of good quality, and the cows were fed during the summer with a grain mixture of 1 pound grain for every 4 pounds milk given. The summer grain ration was made up of the different feeds as used for winter feeding, mixed in the same proportions.

DRY COWS.

When dry, the cows are fed the regular ration of hay and ensilage or roots, and a small ration of grain made up of 300 pounds bran, 200 pounds oil meal, and 100 pounds crushed oats.

RECORD of Dairy Herd, KENTVILLE.

Name of cow.	Age.	Date of dropping calf.	Number of days in lactation period.	Total pounds of milk for period.	Daily average yield of milk.	Average per cent of fat in milk.	Pounds of butter produced in period.	Value of butter, at 30 cts. per pound.	Value of skim-milk, at 20 cts. per hundred pounds.
	Years		Dys.	Lb.	Lb.	p.c.	Lb.	$ cts.	$ cts.
Hillview Victoria......	7	March 5, 1914	265	6,160·25	23·24	4·02	288·91	86 67	11·82
Stamford Countess 10th..............	6	May 15, 1914	280	7,053·25	25·19	4·12	239·02	101 70	13·52
Meadow Princess.....	5	Oct. 26, 1913	306	5,290·25	17·28	4·09	252·43	75 72	10·14
Meadow Maid.........	5	March 11, 1914	259	4,122·25	15·91	3·92	188·52	56 55	7·92
Louisa May 2nd......	5	May 29, 1914	167	2,376·25	14·22	3·86	107·01	32 10	4·56
Burnbrae Fairy.......	3	Oct. 8, 1913	314	2,890·00	9·02	4·06	155·09	46 52	5·51
Meadow Blossom.....	5	Nov. 16, 1913	261	2,749·75	10·53	4·00	128·32	38 49	5·27
Average of 7 head..	......	....	264	4,377·42	16·51	3·96	208·48	62 54	8·39

Experimental Station, Kentville, N.S.

Total value of product.	Amount of meal eaten, at 1½ cts. per pound.	Amount of roots and ensilage eaten, at $2 per ton.	Amount of hay eaten, at $10 per ton.	Months on pasture, at $1 per month.	Total cost of feed for period.	Cost to produce 100 pounds milk.	Cost to produce 1 pound butter, skim-milk not included.	Profit or loss on 1 pound butter, skim-milk not included.	Profit or loss on cow during period, labour and calf not included.
$ cts.	Lb.	Lb.	Lb.	Mos.	$ cts.	cts.	cts.	cts.	$ cts.
98·49	1,794	12,000	3,840	4	62 11	100·8	21·49	8·51	36 38
115·22	2,112	12,000	3,840	4	66 88	94·8	19·07	10·30	48 34
85·86	1,620	12,000	3,840	4	59 50	112·4	23·57	6·43	26 36
64·47	1,158	12,000	3,840	4	52 57	127·5	27·88	2·12	11 90
36·66	656	12,000	3,840	4	45 04	189·5	42·08	−12·08	−8 38
52·03	921	12,000	3,840	4	49 01	169·5	31·60	−1·60	3 03
43·76	879	12,000	3,840	4	48 38	175·9	37·70	−7·70	−4 62
70·93	1,305	12,000	3,840	4	54 78	138·6	29·14	0·57	16 14

REARING OF YOUNG STOCK.

CALVES.

The calf is left with the mother two or three days after it is born, when it is removed and fed on 3 to 4 pounds of whole milk three times per day until 3 weeks old. It is then gradually put on to skim-milk, which feed is continued and increased gradually as the calf grows, but the amount given per day does not at any time exceed 20 pounds. The calf is taught to eat meal when the change is made from whole to skim-milk, beginning with a very small quantity and increasing according to the age. The meal ration is made up of three parts bran, two parts oil-meal, and one part crushed oats. Hay is given at an early age, in quantities that can be eaten up nicely in a short time. Roots or small potatoes are fed also, in small quantities at the start, gradually increasing. The calves are kept in box stalls and allowed to run out during warm days for exercise. All pails used are washed clean after each feeding, and scalded out every day. So far there have been no bowel troubles in calves fed as indicated above.

YEARLINGS.

Yearlings are turned on to pasture during the summer, stabled early in the fall and fed hay and ensilage or roots. From 3 to 5 pounds of mixed grain of the same proportions as used for the calves are fed with the roots or ensilage. Exercise is given in the yard once a day if weather permits. Yearlings fed during the winter on a ration of 8 pounds hay, 30 pounds turnips or 20 pounds ensilage, and 3 to 5 pounds grain per day have made an average gain of 50 pounds per month, at a cost of $3.75 per month or 7½ cents for each pound in weight gained. Care is taken to keep pens, stalls, and mangers clean for the young stock, and all are groomed each day.

KENTVILLE.

EXPERIMENTAL STATION, FREDERICTON, N. B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

DAIRY CATTLE.

Complete dairy records at this Station were not started until August last. At the beginning of the year there were but two cows milking. Since then cows have been bought, the dairy building completed, and a start made in regular dairy work.

On the 14th April four pure-bred Holstein females and a bull, four pure-bred dairy Shorthorn females and a bull, and six pure-bred Ayrshire females and a bull were put in, also a grade Holstein and a grade Ayrshire heifer a few months old.

On the 5th of June, seventeen heifers of very mixed breeding, some of which had lately freshened, were bought, which, with three grade cows then on the Farm, made twenty grade cows. One of the grade cows died in June from blood poisoning. These heifers, with the exception of four, all freshened and were bred again to the Holstein bull. They will be used as the foundation of a grading-up experiment. These heifers of mixed breeding, none of them better than the average cows of the province, have been bred to a Holstein bull. The resulting heifer calves will be carefully reared and bred to a Holstein bull, and so on for several generations so that production figures may be obtained from each generation for comparison with the original cows; the object being to show what improvement may be made in dairy production by good care and feed and the use of a pure-bred bull of a dairy herd.

Next year the dairy Shorthorn bull will be used instead of the Holstein, and the year following the Ayrshire bull will be used.

As it was desired to keep up a milk supply during the winter months, ten grade cows of Ayrshire and Jersey breeding were bought in November. These cows freshened in October, November, December and January. Of these, the following table shows the data of production. The feed given was approximately the same to all. The pasture charge was $2 for the season, as five-sixths of the pasture was uncleared land on which no value could be accurately estimated.

RECORD of Dairy Herd, Experimental Station, Fredericton, N.B.

Name.	Date of Freshening	Milking Period at Experimental Station.	Weight Milk.	Per cent Butter-fat.	Pounds Butter.	Pounds Skim-milk.	Value of Butter at 28 cents per pound.	Value of Skim-milk at 20 cts per 100 pounds.	Value of Calf at birth.	Cost per 100 pounds Milk.	Cost per pound Butter.	Total Value of Products.	Approximate cost of Feed.	Profit.	Loss.
		Days.	lb.	p. c.	lb.	lb.	$ cts.	$ cts.	$ cts.	$ cts.	cts.	$ cts.	$ cts.	$ cts.	$ cts.
Bessie G.	May 7, 1914	205	4,481·0	4·3	221·4	4,259·6	61 99	8 51	2 00	1 05	17·4	72 50	47 10	25 40	
Daisy G.	Feb. 17, 1914	236	4,318·4	4·3	213·5	4,104·9	59 78	8 20	2 00	1 24	21·4	69 98	53 92	16 06	
Blossom G.	April 16, 1914	309	6,402·0	4·4	323·9	6,078·1	90 69	12 15	2 00	1 09	17·8	104 84	69 98	34 86	
Pansy A.	July 22, 1914	250	8,344·7	3·7	354·9	7,989·8	99 37	15 97	25 00	0 65	11·0	140 34	55 00	85 34	
Dawn A.	Oct. 23, 1914	160	4,125·2	4·3	204·0	3,921·2	57 12	7 84	25 00	0 85	13·4	89 96	35 20	54 76	
Helen K. H.	Feb. 15, 1914	254	4,215·6	4·0	193·9	4,021·7	54 29	8 04	50 00	1 37	25·7	112 33	57 88	54 45	
RueBell H.	Jan. 17, 1914	288	6,440·0	3·6	266·6	6,173·4	74 64	12 34	50 00	1 01	19·8	136 98	65 36	71 62	
Pietertje H.	Feb. 21, 1914	260	6,236·2	3·6	258·1	5,978·1	72 26	11 95	50 00	0 95	18·3	134 21	59 20	75 01	
Nettie S.	Jan. 9, 1914	274	3,978·2	3·6	164·6	3,813·6	46 08	7 62	50 00	1 56	33·2	103 70	62 28	41 42	
Spot G.	May 1, 1914	194	2,680·8	4·3	132·4	2,548·4	37 07	5 09	2 00	1 59	20·9	44 16	42 68	1 48	
Jilt S.	May 29, 1914	207	9,005·5	3·8	336·0	8,669·5	94 08	17 33	50 00	0 77	15·5	161 41	69 54	91 87	
Hannah G.	April 4, 1914	256	3,671·1	3·5	147·7	3,523·4	41 35	7 04	2 00	1 59	34·7	50 39	58 32	....	7 93
Tiny G.	May 25, 1914	302	3,429·8	4·0	157·7	3,272·1	44 15	6 54	2 00	1 96	38·6	52 69	67 35	....	14 66
Muley G.	May 20, 1914	302	5,354·6	5·0	307·0	5,047·6	85 96	10 09	2 00	1 25	18·6	98 05	67 35	30 70	
Brindle G.	May 20, 1914	302	4,393·0	5·2	262·7	4,130·3	73 55	8 26	2 00	1 53	22·4	83 81	67 35	16 46	
Julia G.	Mar. 1, 1914	243	3,223·5	4·3	177·9	3,064·1	49 81	6 12	2 00	1 72	27·7	57 93	55 46	2 47	
Nelly G.	May 20, 1914	302	3,950·1	4·0	181·7	3,768·4	50 87	7 53	2 00	1 70	32·9	60 40	67 35	....	6 95
Jersey G.	Sept. 1, 1913	130	2,413·4	5·1	141·5	2,271·9	39 62	4 54	2 00	1 16	16·5	46 16	28 00	18 16	
Sally G.	Mar. 31, 1914	103	1,108·9	4·3	54·8	1,054·1	15 34	2 10	2 00	2 04	37·5	19 44	22 66	....	3 22
Kate G.	Mar. 30, 1914	281	3,902·1	4·5	201·9	3,700·2	56 53	7 40	2 00	1 63	28·0	65 93	63 82	2 11	
Madge G.	Aug. 27, 1913	238	3,856·3	4·4	195·1	3,661·2	54 62	7 32	2 00	1 41	24·1	63 94	54 36	9 58	
Alma G.	Aug. 1, 1914	243	3,486·8	4·8	192·4	3,294·4	53 87	6 58	2 00	1 56	24·9	62 45	54 58	7 87	
Twilight A.	Sept. 11, 1914	202	3,557·9	4·2	171·8	3,386·1	48 10	6 77	25 00	1 25	21·9	79 87	44 44	35 43	
May G.	Nov. 10, 1914	130	2,716·6	4·2	134·3	2,582·3	37 60	5 16	2 00	1 03	17·0	44 76	28 00	16 76	
Maggie G.	Aug. 28, 1913	130	2,403·1	4·5	124·3	2,278·8	34 80	4 55	2 00	1 16	18·9	41 35	28 00	13 35	
Polly G.	Aug. 30, 1913	120	3,019·8	4·6	159·7	2,850·1	44 71	5 70	2 00	0 87	12·9	52 41	26 40	26 01	
Betty G.	Dec. 6, 1914	113	2,875·1	4·1	117·8	2,757·3	32 98	5 51	2 00	0 86	16·4	40 49	24 86	15 63	
Zafli G.	Dec. 18, 1914	101	2,175·0	5·1	110·9	2,064·1	31 65	4 12	2 00	1 02	16·3	37 17	22 22	14 95	

CALF FEEDING EXPERIMENT.

The object of this experiment was to compare whole milk with substitutes with and without skim-milk, and to compare a home-made grain ration with a prepared calf meal commonly found on the market.

Sixteen grade calves of Ayrshire, Holstein, and Jersey breeding were bought as opportunity offered. It was found impossible to secure all heifer calves, and to get more than sixteen, and they varied in age so that the experiment could not date from time of birth. Calves dropped in December and January were taken, the bulls had to be castrated, and it was the 1st of March before enough calves were in condition to start the experiment. Each pen was made up of calves showing Holstein, Ayrshire, and Jersey breeding. One Holstein, one Jersey, and two Ayrshires were put in each pen. In pen III the Holstein calf became ruptured and had to be taken out. The figures following are for the month of March only. The experiment will be continued until June 1.

RATIONS for Month of March.

Pen.	No. of Calves.	Skim-milk.	Whole Milk.	Meal.	Hay and Ensilage.
I.	4	None.	6 to 20 lb. as needed.	None.	As required.
II.	4	10 to 20 lb.	None.	Oats 2 parts; corn, 4 parts, flax, 1 part (all ground)........................	" "
III.	3	None.	None.	Calf meal with water................	" "
IV.	4	10 to 20 lb.	None.	Calf meal with skim-milk............	" "

Ensilage and hay were fed as demanded by the appetite of the calves.

Object of Experiment.—Comparison of milk and substitutes. Values of feeds per ton: Oats, \$40; cornmeal, \$38; oilcake, \$40; Blatchford's calf meal, \$80; whole milk \$28; skim-milk, \$4; ensilage, \$3; hay, \$10.

Calf Feeding Experiment.

		Lot 1.	Lot 2.	Lot 3.	Lot 4.
Number of calves in test	Lb.	4	4	3	4
Total weight at beginning of experiment	"	585	668	482	60[illegible]
Average weight at beginning of experiment	"	146·25	167	160·66	151·75
Total weight at end of one month	"	822	868	563	806
Average weight at end of one month	"	205·5	217	187·66	201·5
Total gain per lot	"	237	200	81	199
Average gain per calf	"	59·25	50	27	49·75
Average gain per calf per day	"	1·91	1·61	·87	1·60
Total meal consumed	"	....	82	231	168
Total whole milk consumed per lot	"	1,512	....	....	....
Total skim-milk consumed per lot	"	....	1,568	....	1,540
Total hay consumed per lot	"	184	184	138	184
Total roots and silage	"	56	56	42	56
Cost of meal fed per lot	$	....	1·56	9·24	6·72
Cost of meal fed per head	"	....	·39	3·08	1·68
Cost of meal fed per head per day	cts.	....	1·25	9·93	5·42
Cost of whole milk fed per lot	$	21·17	....	....	....
Cost of skim-milk per head per day	"	....	3·12	....	3·08
Total cost of feed per head	"	5·54	1·42	3·33	2·70
Total cost of feed per head per day	cts.	17·87	4·58	10·74	8·70
Total cost to produce 1 pound gain	"	9·32	2·84	12·33	5·42
Profit over whole milk ration in producing 1 lb. gain	"	....	6·48	*	3·90
Nutritive ratio of total ration	Lb.	1:4·62	1:3·75	1:3·06	1:3·12
Nutritive ratio of meal ration	"	....	1:6·04	1:3·06	1:3·06
Pounds dry matter to produce 1 pound gain	"	1·55	1·97	4·18	2·36
Pounds of digestible matter to produce 1 pound gain	"	1·47	1·47	2·97	1·78
Pounds of meal matter to produce 1 pound gain	"	None.	4·10	2·85	·84
Pounds of whole milk to produce 1 pound gain	"	6·38	None.	None.	None.
Pounds of skim-milk to produce 1 pound gain	"	None.	7·84	None.	7·73

*In this pen there was a loss in comparison with the whole-milk ration of 3·01 cents in producing one pound of gain.

Fredericton.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

DAIRY CATTLE.

The Ayrshire herd at this Station comprises one good bull and twelve milch cows, three yearling heifers and four heifer calves, all registered. There are also six bull calves, which will be sold for breeding purposes if they develop the qualities hoped for.

In the spring of 1914, sixteen young cows of common breeding were purchased to make a start in a grading experiment to be conducted at this Station. Three-year-old cows, newly freshened, were chosen, and these were bred shortly afterwards to the pure-bred Ayrshire herd bull. All the female progeny of these cows will be kept, and the cows will be sold as soon as each has left two heifer calves. These will in turn be bred to a pure-bred bull of the same breed as their sire, and so on for future generations. The purpose of this experiment is to obtain information as to the value of using a pure-bred sire in a herd of common breeding, as seen by the improvement in the first cross over their dams, and the improvement of the stock at different stages of the successive crossing.

All these heifers came from the common herds of the district, and in appearance and colour they well represent the type of cows which comprise the great majority of the herds in this locality, but as far as their milking qualities are concerned they may, perhaps, be slightly below the average.

Below are given a few figures as to their production and the cost of maintenance for their lactation period:—

RECORDS of Grade Herd.

Name of Cow.	No. of days. in milk.	Total pounds of milk produced.	Average yield of milk per day.	Total cost of Feed	Value of Milk at $1.60 per hundred pounds.	Profit on cow.
	Dys.	Lb.	Lb.	$ cts.	$ cts.	$ cts.
A	281	3,243	11·54	29 23	51 89	22 63
B	281	3,620	12·88	30 02	57 92	27 90
C	312	3,892	12·47	33 51	62 27	28 76
D	281	3,853	13·71	33 07	61 65	28 58
E	312	3,950	12·66	31 61	63 20	31 59
F	312	4,700	15·06	32 74	75 20	42 46
G	120	864	7·2	11 53	13 83	2 30
H	268	3,333	12·43	26 88	53 33	26 45
I	253	2,331	9·21	20 87	37 29	16 42
J	277	2,550	9·21	24 38	40 80	16 42
K	291	2,744	9·43	28 81	43 91	15 10
L	312	3,917	12·55	32 20	62 67	30 47
M	252	2,631	10·44	28 79	42 09	13 30
N	312	3,749	12·01	32 63	59 98	27 35
O	299	4,090	13·68	32 49	65 44	32 95
P	312	3,499	11·22	31 05	55 99	24 94

Following is a list of the feeds consumed by these sixteen cows during their lactation period:—

Grain (wheat bran, 80 per cent; shorts or middlings, 9 per cent; oil cake meal, 11 per cent, fed dry or with ensilage), 19,844 pounds at 1¼ cents per pound..	$ 248 05
Roots or ensilage, 53,590 pounds at $2 per ton..	53 59
Mixed hay, 19,246 pounds at $7 per ton..	67 36
Oat straw, 9,420 pounds at $4 per ton..	18 84
Pasture, 4½ months each at $1 per month..	72 00
Total cost of feed..	$ 459 84

It is, of course, impossible to judge the relative values of the cows in a herd unless all are in the same condition and receiving the same care throughout their whole lactation period, which was not the case with the above cows. They were all brought to this Station on the same day, but their dates of calving differed considerably. One had calved in January, one in March, twelve in April, and two in May; consequently there is not one complete lactation period in the herd.

These cows, coming from different sections of the district, were all submitted to the tuberculin test, and every one passed. This would seem to indicate that tuberculosis is not as prevalent in this locality as it is supposed to be.

Owing to the lack of weighing appliances, it was impossible to ascertain the weights of these animals before August 5. The average weights on August 5, November 5, and March 5 were as follows: August 5, 869 pounds; November 5, 956 pounds; March 5, 1,012 pounds.

As these cows are only 4 years of age, there is every reason to believe that their weight will be increased still more by their natural growth. It is also hoped that this herd will increase largely in production, and consequently in profit. Their average milk production, returns, cost of feed, and profit per cow are as follows:—

Average milk produced by each cow..	Lb.	3,310
" returns from each cow..	$	52 96
" cost of feed..	"	28 74
" profit per cow..	"	24 22

Only seven of the Ayrshire cows finished a complete lactation period during the past year. The average milk production, returns, cost of feed, and profit per cow for these cows are as follows:—

Average milk produced by each cow..	Lb.	7,555
" returns from each cow..	$	120 87
" cost of feed..	"	53 30
" profit per cow..	"	67 57

Their detailed records for the past year are as follows:—

RECORDS of Pure-bred Herd.

Name of Cow.	No. of days in milk.	Total pounds of milk produced.	Average yield of milk per day.	Total cost of feed	Value of milk at $1.60 per hundred pounds.	Profit on cow.
		Lb.	Lb.	$ cts.	$ cts.	$ cts.
Marjorie 2nd	430	9,946	23·13	74 46	159 13	84 67
Soncy 3rd	309	7,405	23·96	40 85	118 48	77 63
Flavia's Girl	350	7,705	22·01	53 54	123 28	69 74
Marjorie 4th	364	7,222	19·84	50 25	115 55	65 30
Flavia's Spot	390	7,464	19·13	52 90	119 42	66 52
Denty 3rd's Own	395	7,670	19·42	56 38	122 72	66 34
Duchess Flavia	357	5,470	15·32	44 71	87 52	42 81

STE. ANNE DE LA POCATIÈRE.

The following foodstuffs were consumed by these seven cows during their lactation period:—

Grain mixture, 17,248 pounds at 1¼ cents per pound	$ 215 60
Mixed hay, 17,823 pounds at $7 per ton	62 38
Roots and ensilage, 46,858 pounds at $2 per ton	46 86
Oat straw, 8,375 pounds at $4 per ton	16 75
Pasture, 4½ months each at $1 per month	31 50
Total cost of feed	$ 373 09

NOTE.—The green feed (peas and oats) given to these cows is valued at the same price as the ensilage, namely, $2 per ton.

Attention is drawn to the fact that the last three cows in the above table are heifers with their first calf; consequently part of the feeds consumed would be required for the development of these animals, besides maintenance and the production of milk. This would naturally decrease the profit from these cows to quite an appreciable extent.

Considering the unfavourable housing conditions at the start of the lactation period, and the fact that the cows were transferred to the new stables in March, 1914, the returns are quite satisfactory. The average cost of producing milk in each herd is as follows:—

Ayrshire herd	70·5 cents per hundred pounds.
Grade herd	86·8 " "

COST of Rearing Three Bull Calves Sold as Breeding Sires during the Year.

"Domo de Ste. Anne," sold at 223 days of age.

Whole milk, 1,180 pounds at $1.60 per hundred pounds	$ 18 88
Grain mixture, 516 pounds at 1¼ cent per pound	6 45
Clover hay, 582 pounds at $7 per ton	2 04
Roots and ensilage, 620 pounds at $2 per ton	62
Flaxseed, 26 pounds at 4 cents per pound	1 04
Total cost of feed	$ 29 03
Selling price	45 00
Profit above cost of feed	$ 15 97

"Flavia de Ste. Anne," sold at 204 days of age.

Whole milk, 1,020 pounds at $1.60 per hundred pounds	$ 16 32
Grain mixture, 496 pounds at 1¼ cents per pound	6 20
Clover hay, 734 pounds at $7 per ton	2 57
Roots and ensilage, 820 pounds at $2 per ton	82
Flaxseed, 23 pounds at 4 cents per pound	92
Total cost of feed	$ 26 83
Selling price	60 00
Profit above cost of feed	$ 33 17

"Major," sold at 234 days of age.

Whole milk, 1,035 pounds at $1.60 per hundred pounds	$ 16 56
Grain mixture, 540 pounds at 1¼ cents per pound	6 75
Clover hay, 950 pounds at $7 per ton	3 32
Roots and ensilage, 1,250 pounds at $2 per ton	1 25
Flaxseed, 37 pounds at 4 cents per pound	1 48
Total cost of feed	$ 29 36
Selling price	50 00
Profit above cost of feed	$ 20 64

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COST of rearing Three Heifer Calves from Birth to 12 months of age.

"Duchesse de Ste. Anne."

Whole milk, 1,275 pounds at $1.60 per hundred pounds	$ 20 40
Grain mixture, 1,369 pounds at 1¼ cents per pound	17 11
Clover hay, 1,580 pounds at $7 per ton	5 53
Roots and ensilage, 1,598 pounds at $2 per ton	1 60
Flaxseed, 35 pounds at 4 cents per pound	1 40
Pasture, 3 months at $1 per month	3 00
Total cost of feed	$ 49 04

"Flavia de Ste. Anne."

Whole milk, 1,125 pounds at $1.60 per hundred pounds	$ 18 00
Grain mixture, 1,320 pounds at 1¼ cents per pound	16 50
Clover hay, 1,004 pounds at $7 per ton	3 52
Roots and ensilage, 1,260 pounds at $2 per ton	1 26
Flaxseed, 28 pounds at 4 cents per pound	1 12
Pasture, 3 months at $1 per month	3 00
Total cost of feed	$ 43 40

"Soncy de Ste. Anne."

Whole milk, 980 pounds at $1.60 per hundred pounds	$ 15 68
Grain mixture, 1,064 pounds at 1¼ cents per pound	13 30
Clover hay, 1,620 pounds at $7 per ton	5 67
Roots and ensilage, 1,580 pounds at $2 per ton	1 58
Flaxseed, 28 pounds at 4 cents per pound	1 12
Pasture, 3 months at $1 per month	3 00
Total cost of feed	$ 40 35

At the time these calves were dropped the milk was sold at the price charged above, namely, $1.60 per hundred pounds, owing to the lack of equipment necessary for the separating and manufacturing of the same at this Station. In the feeding of calves, skim-milk replaces whole milk to advantage after the first week, reducing the cost materially. The flaxseed meal was given in the milk, after the third week. One ounce of this meal was fed at the start, replacing 1 pound of milk. The second week 1 ounce replaced 2 pounds of milk, and so on. Five ounces was the maximum given to each calf per day. The grain mixture, composed of crushed oats, wheat bran, and shorts, was fed dry mixed with the roots, starting when the calves were 4 weeks of age.

On March 5, at the ages, respectively, of 13, 14 and 16 months, the weights of these heifers were as follows:—

	Pounds.
"Duchesse de Ste. Anne"	530
"Flavia de Ste. Anne"	595
"Soncy de Ste. Anne"	690

The cost of raising these heifers will be recorded to the date of their first calving.

STE. ANNE DE LA POCATIÈRE.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

DAIRY CATTLE.

The herd now comprises twenty-nine head of pure-bred and ten grade French Canadians. There are four bulls, one aged, a 2-year-old, a yearling, and a calf; eighteen cows; thirteen heifers; and four heifer calves. These cattle are kept to supply milk to the dairy, to sell breeding stock at reasonable figures, and for experimental breeding and feeding.

EXPERIMENTAL BREEDING.

The grades, bred to a registered bull, have produced heifers which are better looking and heavier, on an average, than their dams. These heifers have been bred, most of them, to their sire, and will calve when about 3 years of age. Both the old bull and his daughters were of a strong, rugged constitution, they were all larger than the average for the breed, they had no serious defect in common, and it is expected that these qualities will be intensified by this in-breeding. The herd bull, at Cap Rouge, is acknowledged to be the best of the breed in existence to-day, as far as conformation goes, and he is out of a very good milker. The heifers are out of cows whose milk yield is known, and it will certainly be interesting to watch them during their first period of lactation.

The best registered cow, that will qualify for the Record of Performance with about 3,000 pounds of milk to spare, will be bred to her son, now 2 years old, and which was sired by the old bull. This young bull will be used on the progeny of the heifers which were served by their sire, so that in-breeding will be followed by line breeding.

MILK PRODUCTION.

The following table gives details regarding the cows which finished a period of lactation during the year, that is, between April 1, 1914, and March 31, 1915. In comparing with last year's figures the most noteworthy fact is that the yearly milk production has increased 1,810 pounds and that of butter 59·44 pounds per cow.

Record of Dairy Herd Experimental

Name of Cow	Registration No.	Age at beginning of lactation period.	Date of dropping calf	Number of days in lactation period.	Total pounds of milk for period.	Daily average yield of milk.	Average per cent fat in milk.	Pounds of butter produced in period.
		Yrs.		Days.	Lb.	Lb.	p. c.	Lb.
Empire	2395	3	Sept. 5, 1913	437	8,920·75	20·41	4·26	447·51
La Brune du Sable	2440	9	July 18, 1913	583	10,492·25	18·00	4·32	534·02
Finette 2eme	218	8	March 4, 1913	341	8,039·25	23·57	4·00	398·21
Denise Besse	1269	8½	Jan. 15, 1914	304	8,396·25	27·71	3·83	378·94
Princesse du Sable	2261	3	Nov. 13, 1913	368	7,076·50	19·23	4·16	347·05
Nanette de St. Denis	2413	3	Aug. 22, 1913	256	5,974·25	23·34	4·27	300·68
Kate	Grade	......	April 11, 1913	495	8,279·50	16·72	4·05	394·78
Jeannette de St. Denis	2409	8	June 24, 1913	368	7,563·75	20·55	4·07	362·07
Baronne de St. Denis	2511	8	April 21, 1913	492	7,565·75	15·37	3·90	347·62
Gipsy	Grade	......	Dec. 30, 1913	323	5,203·75	16·11	3·72	227·85
Exilée de Kamouraska	2414	3	Aug. 11, 1913	338	5,179·25	15·32	4·31	262·64
Hilda	Grade	......	June 18, 1913	385	6,487·00	16·85	3·58	273·16
Eva	Grade	......	June 12, 1913	320	5,929·75	18·53	3·79	270·14
Average—13 head	....	......	....	385	7,316·00	19·00	4·06	349·59

Cap Rouge.

Station, Cap Rouge, Quebec.

Value of butter at 28 cts. per lb.	Value of skim-milk at 20 cts. per cwt.	Total value of product.	Amount of meal eaten, at 1¼ cts. per lb.	Amount of roots and ensilage eaten at $2 per ton.	Amount of hay eaten, at $7 per ton.	Amount of green feed eaten, at $3 per ton.	Months on pasture, at $1 per month.	Total cost of feed between calvings.	Cost to produce 100 lb. of milk.	Cost to produce 1 lb. of butter, skim-milk neglected.	Profit on 1 lb. of butter (skim-milk neglected.)	Profit on cow between calvings, labour, manure and calf neglected.
$ cts.	$ cts.	$ cts.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
125 30	17 08	142 38	2,443	11,314	3,026	7,859	......	64 26	0·72	0·140	0·14	78 12
149 53	20 07	169 60	4,203	16,094	3,600	8,245	1½	95 11	0·90	0·178	0·102	74 49
111 50	15 40	126 91	2,269	5,726	2,247	7,290	1½	54 39	0·67	0·111	0·169	72 52
106 11	16 14	122 25	2,507	10,591	3,104	4,537	......	59 60	0·709	0·157	0·123	62 65
97 17	13 54	110 71	2,181	10,832	2,945	5,962	......	57 35	0·81	0·165	0·115	53 36
84 19	11 43	95 62	1,737	8,497	1,504	5,616	23/30	44 62	0·746	0·148	0·132	51 00
110 54	15 89	126 43	3,147	10,343	3,136	9,339	1½	76 16	0·87	0·192	0·088	50 27
101 38	14 51	115 89	3,370	9,632	2,462	7,628	1½	73 31	0·97	0·202	0·078	42 58
97 33	14 54	111 87	3,013	12,093	3,090	7,691	1½	73 07	0·966	0·21	0·070	38 80
63 79	10 02	73 80	1,556	8,583	2,461	2,925	......	41 03	0·788	0·18	0·10	32 77
73 54	9 91	83 45	2,130	8,747	2,068	5,665	1½	52 60	1·015	0·20	0·08	30 85
76 49	12 51	89 00	2,336	11,231	2,992	7,491	½	63 66	0·981	0·233	0·047	25 34
75 64	11 41	87 05	2,545	11,513	2,969	7,289	1½	66 15	1·116	0·243	0·037	20 90
97 89	14 04	111 93	2,572	10,399	2,738	6,733	0·9	63 18	0·866	0·18	0·10	48 74

An interesting fact is that the six cows at the head of the list gave a total profit of $392.14 for $375.33 worth of feed consumed, or 104 per cent, whilst the seven at the bottom of the list gave a total profit of $241.51 for $445.98 worth of feed consumed, or 54 per cent. This is telling over again the same old story, that the best cows only should be kept, but it can stand to be told often.

EXPERIMENTAL FEEDING.

The experiment begun last year with nine cows was continued this year with six, to find out the best quantities of meal to be fed. All the cows, which were nearly of the same weight, received exactly the same quantity of roughage, hay, ensilage, swedes; two of them ate as much meal as they could clean, which was about one pound per 2·5 pounds of milk, two others received 1 pound of meal per 4 pounds of milk, and the last two received 1 pound of meal per 8 pounds of milk. The experiment lasted about five months, and great care was taken to weigh all the feed and milk correctly. Partitions were put in the mangers so that a cow could not steal her neighbour's food, and sawdust was used for bedding, so that no straw could be eaten.

The results of the two years, added together, show that the cows which had unlimited quantities of meal gave the most profit. It is proposed to continue the experiment for three years more, when detailed figures of the whole thing can be published.

The food values were calculated as follows: meal 1¼ cents per pound; roots and ensilage, $2 per ton; hay, $7 per ton; whilst butter was valued at 28 cents per pound, and skim-milk at 20 cents per cwt. Labour, interest, depreciation, and manure were neglected. This, of course, would not change the relative profits of the different ways of feeding.

COST OF RAISING HEIFERS.

All the feed given to three heifer calves was weighed carefully, as it is the intention to find out how much it costs to raise heifers until they milk. The following table gives details:—

Cap Rouge.

Cost of Raising Heifers.

Name of Cow.	Register No.	Date of birth.	Weight at birth.	Weight at 6 months	Age March 31.		Feed Eaten.					Cost.
							Whole Milk.	Skim Milk.	Meal.	Hay.	Roots (Swedes)	
			Lb.	Lb.	Mos.	Days	Lb.	Lb.	Lb.	Lb.	Lb.	$ cts.
Jeannette de Cap Rouge	3,490	Aug. 12, 1914	49	315	7	19	1,098	3,416	151	257	775	27 25
Henriette " "	3,574	Sept. 26, 1914	76	377	6	4	1,065	2,907	101	228	759	24 98
Reine " "	Grade	Oct. 21, 1914	76	391	5	7	922	2,212	97	194	664	21 16
Average			67	361	6	10	1,028	2,845	116	226	733	24 30

Whole milk was calculated at $1.50 per cwt., skim-milk at 20 cents per cwt., meal at $1\frac{1}{4}$ cents per pound, hay at $7 per ton, and roots at $3 per ton.

These heifer calves are exceedingly well grown, and the average cost of the feed to bring them to six months was $23.18. It is probable that experiments to be soon undertaken here will show that the cost could have been decreased, and the calves as well grown, with more skim and less whole milk.

SELLING BREEDERS AT A REASONABLE COST.

There are now in the herd nine cows which qualified for Record of Performance, and there can be no doubt that these are proved high-class producers. The male calves of these cows cannot help but improve the herds where they will be used for service. Besides the above mentioned nine cows, all the others, also the heifers, will be required to qualify, or will go to the butcher. This means that only good yielders will be kept; their produce, sold at reasonable prices, will be of more benefit to the farmers of the district than the amount spent to take care of and feed the whole herd. This is so well understood that the Live Stock Breeders' Association of the Province of Quebec, who annually sell a large number of cattle, hogs, and sheep at auction, have reserved every one of the bull calves from cows which have qualified for Record of Performance for an unlimited number of years.

CAP ROUGE.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

DUAL-PURPOSE AND DAIRY CATTLE.

The breeding herd at the Brandon Experimental Farm on March 31, 1915, consists of the following:—

Shorthorn: One bull, fifteen milch cows, and twelve heifers and calves.
Ayrshire: One milch cow.

Grade: Two milch cows, 2 calves.

Most of the Shorthorns on this Farm are of the dual-purpose type. They are being bred and fed for the production of milk, as well as for suitability for beef. The average milk production of this herd is improving each year, and the best record this year (12,800 pounds of milk containing 486·3 pounds of butter-fat) would rank as good dairy production in any breed. Six young bulls of this strain were sold to farmers in Western Canada during the year. A great many more could have been sold had they been available.

MILK RECORDS.

The accompanying table shows the milk records for all the cows that finished a milking period during the fiscal year of 1914-15. The records are reported by the lactation period rather than by the calendar or fiscal year. A number of lactation periods are longer than desirable; this is due to delay in conception due to lack of virility in a bull. The feed is counted from the time a cow dries up in milk flow until she dries up again. It is only fair to the cows that show a loss to say that they are purely of beef type and breeding. Several of the others are of similar breeding, but seem to be better able to respond to dairy conditions. In addition to this list, there are some heifers that have not finished their first lactation period, and two older cows that are milking but did not finish a period during the year.

The milk is valued at 1½ cents per pound, as this seems a fair valuation for the West; it was really sold at from 1¾ to 2 cents per pound.

The testing of the milk for butter-fat was commenced on January 1, 1914; consequently the figures on this point are not available for lactation periods that commenced before that date.

BRANDON.

MILK RECORDS.

Name of Cow.	Age at beginning of lactation period.	Date of dropping calf.	Number of days in lactation period.	Total pounds of milk for the period.	Daily average yield of milk.	Average per cent of fat in milk.	Pounds of fat produced in the period.	Value of whole milk, at 1½ cents per pound.	Amount of meal eaten, at 1 cent per pound.	Amount of roots and ensilage eaten, at $3 per ton.	Amount of hay eaten, at $10 per ton.	Amount of green feed eaten, at $3 per ton.	Amount of straw eaten, at $2 per ton.	Months on pasture, at $1 per month.	Total cost of feed between calvings.	Cost to produce 100 pound of milk.	Profit on cow between calvings, labour and calf neglected.
	Yrs.		Dys.	Lb.	Lb.	p.c.	Lb.	$ cts.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts.	Cts.	$ cts.
Ottawa Marchioness 5th........S.	5	Mar. 6, 1914	383	12,800	33·4	3·8	486·3	192 00	4,673	16,764	2,712	182	1,071	4½	91 27	71·3	100 73
Marigold.................Grade	2	Jan. 27, 1914	429	10,340	24·1	4·3	444·	155 10	4,340	9,473	2,557	226	1,247	5⅓	77 31	74·7	77 79
Ottawa Janet 4th.............S.	3	Mar. 18, 1913	401	8,462½	21·1	......	......	126 93	2,347	10,261	1,480	252	1,556	4½	52 69	62·2	74 24
Brandon Marchioness.........S.	2	Nov. 25, 1913	492	9,993	20·3	3·75	374·6	149 97	4,723	11,984	2,704	226	1,820	5⅓	86 21	87·2	63 76
Brandon Paeony...............S.	2	Oct. 20, 1913	472	9,750½	20·6	......	......	146 25	4,773	11,296	2,341	226	1,499	5½	83 71	85·8	62 54
Daisy of Brandon..............S.	8	May 5, 1913	554	7,838½	14·1	......	......	117 57	2,893	9,541	1,579	252	1,345	12	64 85	82·7	52 72
Illuminata 3rd.................S.	9	June 3, 1913	345	7,017	20·3	......	......	105 25	2,475	10,881	1,590	252	1,638	4½	55 54	79·1	49 71
Brandon Fairy.................A.	2	Sept. 10, 1913	438	7,160	16·3	......	......	107 40	3,508	9,068	1,722	238	1,162	7	65 80	91·9	41 60
Rose of Brandon...............S.	10	May 9, 1913	371	6,331½	17·06	......	......	94 97	2,316	10,665	1,594	252	1,659	4½	53 67	84·7	41 30
Brandon Hannah...............S.	2	Oct. 8, 1913	446	6,267	14·05	......	......	94 00	3,581	10,406	1,875	226	1,358	5½	67 99	108·4	26 10
Duchess 3rd....................S.	6	Jan. 4, 1914	187	4,648	24·8	......	......	69 72	2,467	8,107	1,185	252	1,097	2	46 22	99·4	23 50
Illuminata 4th..................S.	7	Oct. 13, 1913	465	5,840	12·5	......	......	87 60	3,343	11,449	1,605	252	1,545	11	71 54	122·5	16 06
Poppy of Brandon..............S.	6	April 8, 1914	326	5,796	17·7	4·01	232·7	86 94	3,774	10,108	2,277	......	1,639	5½	71 42	123·2	15 52
Brandon Princess..............S.	2	Nov. 7, 1913	348	2,795	8·03	......	......	41 92	2,446	7,948	1,281	238	1,013	5¾	49 89	178·5	Loss 7 97
Brandon Beauty...............S.	5	May 12, 1914	276	4,145	15·	3·8	159·3	62 17	3,678	10,050	2,503	252	1,831	7	73 57	177·4	Loss 11 40

WINTER RATIONS FOR DAIRY COWS.

A most important factor in producing milk in the winter is the feed. The following rations were fed to the dairy herd during the past winter with very good results:—

Roughage.—5 pounds mixed hay per day; 5 pounds alfalfa hay per day; 5 pounds oat and barley straw per day; 35 pounds ensilage per day; 10 pounds roots per day.

Meal.—Equal parts oat-chop and bran fed in the proportion of 1 pound of meal to every 3½ or 4 pounds of milk given.

The corn ensilage and the alfalfa are found to be especially valuable in keeping up a good flow of milk during the winter. As a result of the use of these feeds, the average flow of milk is higher in this herd in the winter than in the summer. The growing of these crops, and the building of a silo for the storing of the corn, are strongly recommended to any farmers in Manitoba who are going in for dairying.

COST OF RAISING HEIFERS.

Detailed records have been kept of the feed given to all the calves and heifers, as well as to the milking cows. As a result, data are available in regard to the cost of raising heifers under the conditions which exist here. The three statements that follow show the cost for the first, second, and third year of the animal's life.

Pansy of Brandon—From Birth to 1 Year.

Born April 8, 1914; weight at birth, 75 pounds; weight, March 31, 1915, 634 pounds.

Feed consumed during the year—

290 pounds	whole milk at 1½ cent per pound	$4 35
1,988 "	skim-milk at 20 cents per hundred pounds	3 97
1,475 "	corn silage at $3 per ton	2 21
312 "	straw at $2 per ton	31
287 "	alfalfa at $12 per ton	1 72
510 "	mixed hay at $10 per ton	2 55
890 "	grain at $20 per ton	8 90
	Total cost	$24 01

Brandon Marjory—From 1 Year to 2 Years.

Born March 28, 1913; weight April 1, 1914, 600 pounds; weight, March 31, 1915, 925 pounds.

Feed consumed during the year—

3,750 pounds	silage at $3 per ton	$5 62
664 "	straw at $2 per ton	66
690 "	alfalfa at $12 per ton	4 14
770 "	mixed hay at $10 per ton	3 85
470 "	grain at $20 per ton	4 70
6 months	on pasture at $1 per month	6 00
	Total cost	$24 97

Brandon Marchioness Bess—From 2 to 3 Years.

Born November 20, 1911; weight, November 20, 1913, 1,010 pounds; weight, November 20, 1914, 1,290 pounds.

Feed consumed during the year—

5,532 pounds	silage at $3 per ton	$ 8 30
956 "	straw at $2 per ton	95
380 "	alfalfa at $12 per ton	2 28
812 "	mixed hay at $10 per ton	4 06
567 "	grain at $20 per ton	5 67
6 months	on pasture at $1 per month	6 00
	Total cost	$27 26

BRANDON.

BUILDINGS.

SILO.

A new silo was built this year. It is of solid concrete construction, 16 feet across inside, and 34 feet high. The walls are 9 inches thick and are well reinforced with $\frac{3}{8}$-inch iron rods running both vertically and horizontally. The proportions of the ingredients used in making the cement was $1\frac{1}{4}$ cement to 2 sand and 4 crushed granite. It is believed that a very substantial and durable structure has been the result.

As the old silo, which has been in use on this Farm for several years, is wooden-stave construction above the ground, it will be possible to compare the two types of silo.

ROOT CELLAR.

A commodious root cellar was also built, under ground, in the side of the hill, behind the cattle barn. The outside dimensions are 30 feet by 40 feet, but a feed room comes out of this area. It is built of reinforced cement throughout. The roof is a reinforced concrete slab 6 inches thick. It is supported by reinforced concrete beams and pillars.

ALFALFA SILAGE.

The question is sometimes raised, whether or not alfalfa is suitable for storing in the silo. Results obtained by American investigators show that the pure alfalfa ensilage is not very satisfactory, as disagreeable odours and flavours arise. An experiment was tried this year in storing green alfalfa along with corn. The two were not mixed, but were put in by the wagon-load, in proportion of one load of alfalfa to two of corn. The weight of the corn packed the alfalfa thoroughly, and its juices permeated it so that the alfalfa kept as well as the corn. It came out in excellent condition, and was eaten with great relish by the cattle.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MacBEAN, B.S.A.

DUAL-PURPOSE CATTLE.

The breeding herd is composed of the following:—

Shorthorns: one bull, one yearling bull, twenty milch cows, two 2-year old heifers, two yearling heifers, eleven heifer calves, five bull calves.
Grades: one cow, one yearling heifer, one bull calf.

There being much demand in Western Canada for cattle of the dual-purpose type, some eighteen months ago the question of breeding a strain of such cattle at this Farm was given careful consideration. The result was that, instead of handling the existing herd of Shorthorns purely on the lines of a beef herd, as had been done in previous years, future work was to entail the development of the milking or dual-purpose Shorthorn.

All the cows, practically, being of beef conformation, it naturally follows that, though the sire at their head is bred from a strain of well-bred milking Shorthorns, some time will elapse before fruitful results are forthcoming. It is, after all, in the progeny of this bull that our expectations lie, whereby, through a rigid process of selection and culling out, hopes are entertained for the building up, by degrees, of a desirable herd of dual-purpose Shorthorns at this Farm.

A quicker means towards this end would be by the installation of a new herd of strictly dual-purpose cattle, but, as this would necessitate considerable outlay, the only alternative is that outlined above.

It is well to note that as this line is one in which the farmers of the Indian Head and surrounding districts are very much interested, no better line of work with cattle could be undertaken at this Farm than the development of a cow that will give a profitable flow of milk and also produce a calf that will develop into a good beef steer.

That this is certainly the cow and the only cow for the average prairie farmer is a fact that should withstand any criticism. His location and distance from market is invariably such that the general purpose cow is the one for him, and not the specialized beef or dairy cow.

The demand for young stock sired by the bull heading the herd at present is all that could be desired, the fact being that the demand far exceeds the supply. Bull calves are spoken for before birth, while inquiries are being continually made for heifers also. Meantime, no females are sold, as it is necessary to retain them in the herd long enough to ascertain whether they may develop into desirable milking Shorthorns or not, while their retention in the herd is also required for its development.

During the past season three young bulls were sold from the Farm, while as many more were asked for but were not available.

Although, in this work, the most expected from the cows is that they may raise heifers conforming to the type desired, yet it may be in place to refer to the lactation record of one or two of the cows to show that some of them are fairly good milkers, though in conformation they are of beef type.

Taking two cows as examples of what constitutes the herd, the following are the results of their last lactation periods:—

Both cows are aged, one being 7 and the other 9 years old. The former, "Prairie Red Rose 4th," milking from January 17 until November 30, 1914, gave a yield of 5,452 pounds of milk with a fat test of 3·7 per cent. The latter, "Rosebud," her lactation period running from January 8 until November 18, 1914, gave 5,219 pounds of milk, also testing 3·7 per cent.

Considering the fact that these cows had not been milked by hand previous to last season, these returns are very satisfactory. It is no exaggeration to state that, if the milking tendency in them had been encouraged at the age of 2½ years, they probably would have developed into very good milkers. It is also worthy of note that the younger of the two will easily beat her last year's record if she continues to keep up to her present standard, as she is milking much better this season than last.

Since it is probable that heifers reared from such cows will be heavier milkers than their dams as long as there is a sire of high quality retained at the head of the herd, it is not too much to conclude that, in process of time, this Farm will be in possession of a very fair type of milking Shorthorn.

By paying the strictest attention and consideration to the development of the dual-purpose Shorthorn at Indian Head, great possibilities are open for doing splendid work towards materially assisting the average prairie farmer.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

DAIRY CATTLE.

There are on hand, at the close of the year, eighteen pure-bred Holstein cattle. A number of the heifers are entered in the Record of Performance test, and two have qualified during the year, with records of 290 and 326 pounds of fat respectively in their 2 year-old form. The heifer "Lawncrest Lee Beets" has finished her lactation period as a 3 year-old, in which she produced over 13,700 pounds of milk.

During the year, the son of "Rosalind of Old Basing"—1714 has been purchased and, should this animal develop and breed as may be expected from the remarkable production of his dam, he will prove a satisfactory head for the Jersey herd.

The cow "Brampton Wolseley Girl" is still producing well.

The work of grading up the common herd by the use of a high-class pure-bred sire is developing in interest and should prove of great importance. The record of this herd of common grades shows that they are capable of producing an average of about 5,200 pounds of milk as fully mature cows. While making this average production they were housed in the same stable and fed equally well in proportion to the amount of milk being produced as was the herd of high-grade Holsteins and the herd of pure-bred Holsteins.

The following table shows the production of each individual in the three herds, fed and housed in the same manner. If the breeding-up test now under way shows a like increase in production, as a result of breeding to pure-bred sires, the experiment will be well worth while, not in the sense of proving anything new, but as an additional demonstration of the advantage of using good blood of the same breed in each successive step in the development of the herd. It should be pointed out that the common grade cows in this test, at the time of making the records given, were fully matured, and the average production reached represents the maximum of which these cows are capable under favourable conditions as to feed and management.

The high-grade Holsteins came in between the ages of 2 and 3 years old and were not bred to freshen within as short a time as if they had been fully mature. The fact that they were not bred and were milking for a very long lactation period gives them an advantage. On the other hand, they were at a disadvantage in regard to their age.

With one exception the herd of pure-bred Holsteins were heifers, 2 and 3 years old, and the very high daily average production of this herd of heifers, as compared with the daily production of the high-grade herd and the herd of common grades emphasizes the importance of breeding.

RECORDS of Common Grade Cattle at the Dominion Experimental Station, Lacombe.

Name or No. of Cow.	Freshened.	Pounds Milk	Butter-fat.
		Lb.	p.c.
Grade No. 5	March 13, 1914	4,993·9	4·4
" 1	February 8, 1914	6,113·4	3·7
" 7	March 2, 1914	9,814·6	3·8
" 4	May 20, 1914	3,011·3	4·0
" 33	December 24, 1913	4,401·3	3·0
" 34	" 27, 1913	8,349·6	5·7
" 30	July 17, 1914	5,467·0	4·1
" 31	May 2, 1914	4,681·0	3·5
	Average	5,203·6	4·0

Average number of days in lactation period... 322
Average pounds milk per day.................. 16·1

RECORDS of High Grade Holsteins at the Dominion Experimental Station, Lacombe.

No. of Cow.	Freshened.	Pounds Milk.	Butter-fat.
		Lb.	p.c
Grade 11	December 7, 1913	12,255·8	3·4
" 12	April 19, 1913	13,469·2	4·4
" 13	March 31, 1914	8,117·4	3·9
" 14	January 12, 1914	10,065·4	3·6
" 15	December 22, 1913	11,456·2	3·9
" 17	" 11, 1913	9,409·0	4·1
" 18	" 23, 1913	5,845·3	4·0
" 19	February 4, 1914	7,946·5	3·4
" 20	March 17, 1914	10,886·2	3·4
	Average	9,939·0	3·7

Average number of days in lactation period... 451
Average pounds milk per day.................. 22·0

RECORDS of Pure-Bred Holsteins at the Dominion Experimental Station, Lacombe.

Name of Cow.	Freshened.	Pounds Milk.	Butter-fat.
		Lb.	p.c.
Nine Gem Lutske	April 15, 1914	12,038·8	3·1
Lawncrest Lee Beets	May 5, 1914	13,768·1	3·1
Lenore Del Berke Star	March 23, 1914	10,556·2	3·4
Lawncrest Rosa Echo	June 6, 1914	9,308·6	3·1
Maud Sarcastic	March 2, 1914	7,233·8	3·0
Princess Margaret Helbon	May 14, 1914	7,083·2	3·7
Vrouka B. 3rd	August 13, 1914	6,554·0	3·8
Rhoda DeKol Beets	" 3, 1913	8,741·4	3·3
Daisy Johanna Ormsby	September 26, 1913	9,264·2	3·5
	Average	9,505·3	3·3

Average number of days lactation period...... 303
Average pounds milk per day.................. 31·[illegible]

LACOMBE.

DAIRY COW RECORDS.

Herewith is submitted a record of all the cows which have completed one or more lactation periods during the twelve months ending March 31, 1915:—

RECORD of Dairy Herd—Experimental Station, Lacombe, Alta.

Name of Cow.	Date of Dropping Calf.	Amount of chop eaten, at 1 cent per pound.	Amount of hay eaten, at $10 per ton.	Amount of green feed eaten, at $10 per ton.	Amount of straw eaten, at 20 cents per 100 pounds.	Hmount of roots eaten, at $3 per ton.	Amount of silage eaten, at $3 per ton.	Months on pasture.	Total cost of feed between calving.	Total milk.	Test.	Number of days in lactation period.	Value of milk at $2 per cwt.	Cost to produce 100 pounds milk.	Profit on 100 pounds milk.	Profit on cow between calving, (calf and labour neglected.)
	1913.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Mos.	$ cts	Lb.	p.c.	Days.	$ cts.	$ cts.	$ cts.	$ cts.
Lawncrest Rosa Echo	January 13	3,237	2,325	3,720	......	9,436	......	5½	82 25	12,941·2	3·1	499	258 83	0 64	1 36	176 58
Princess Margaret Helbon	February 9	2,483	2,025	3,510	......	8,374	......	5½	70 57	9,923·8	3·2	473	198 47	0 71	1 29	127 90
Brampton Wolseley Girl	April 5	2,415	3,150	1,650	......	7,260	......	8½	67 45	8,595·7	5 95	500	171 91	0 78	1 22	104 46
Grade 30	April 29	1,815	2,860	2,210	......	7,800	......	5½	60 70	7,607·3	3·85	388	152 14	0 80	1 20	91 44
Grade No. 29	April 26	1,375	2,510	1,950	......	6,340	......	5½	51 06	5,313·2	3·17	369	106 26	0 96	1 04	55 20
Vrouka B. 3rd	July 28	2,270	3,840	1,820	......	7,470	......	5½	67 70	6,191·4	3·78	324	123 83	1 09	0 91	56 13
Rhoda DeKol Beets	August 3	3,025	4,270	1,650	......	9,650	......	4½	78 82	8,741·4	3·47	352	174 83	0 90	1 10	96 01
Daisy Johanna Ormsby	Sept. 26	3,248	4,165	1,830	......	9,550	......	5½	82·27	9,324·3	3·66	367	186 48	0 88	1 12	104 21
Grade No. 32	Sept. 12	1,582	2,520	1,800	......	5,430	......	2½	48 07	5,968·5	3·76	265	119 37	0 81	1 19	71 30
Grade Holstein 18	Dec. 23	1,532	1,910	1,260	......	6,600	......	4½	45 57	5,905·3	3·76	292	118 10	0 77	1 23	72·53
Grade No. 33	Dec. 24	1,156	2,700	1,185	......	5,980	......	5½	45 45	4,401·3	3·31	317	88 02	1 03	0 97	42 57
	1914.															
Brampton Wolsley Thelma	January 22	1,675	2,570	1,060	320	6,370	1,342	5	52 10	6,269·0	5·0	372	125 38	0 83	1 17	73 28
Grade No. 1	February 8	1,593	1,650	1,185	......	6,159	......	4½	43 82	6,113·4	3·85	236	122 26	0 72	1 28	78 44
Maud Sarcastic	March 2	2,618	2,045	820	......	3,050	......	4½	49 58	7,233·8	3·37	234	144 67	0 69	1 21	95 09
Grade No. 5	March 13	1,193	1,125	850	128	3,600	780	5½	34 63	4,895·3	3·93	282	97 91	0 70	1 30	63 28
Nina Gem Lutske	April 15	3,355	2,460	1,789	410	1,520	1,950	5	65 72	12,038·8	3·26	305	240 78	0 54	1 46	175 06
Grade No. 4	May 20	810	275	3,000	......	270	......	5	29 87	3,111·3	3·61	171	62 23	0 96	1 04	32 36
Tehlma's Gem	May 20	1,143	1,260	950	320	1,830	560	5	31·71	3,685·4	5·1	272	73 71	0 85	1 15	42 00
Lawncrest Rosa	June 6	2,477	1,010	840	728	900	1,760	5	44 46	9,508·6	3·36	249	190 17	0 46	1 54	145 71

LACOMBE.

FEEDING TRIALS WITH DAIRY CATTLE.

With the object of obtaining data as to the comparative value of different fodders, feeding trials were begun in November, and continued throughout the entire winter.

All of the dairy cattle not entered in the Record of Performance test were included in these trials. A grain ration, uniform in quality and quantity, was fed throughout the entire duration of this test, and therefore the only variation consisted in the change of rough fodders from period to period. In each case a two weeks feeding test was conducted, and the first week was considered as a preliminary period, the results not used. Two or three facts have been emphasized by these trials:—

(1.) The advantage of succulent fodders for dairy cattle throughout the winter is shown.

(2.) The advantage of peas and oats for ensilage has been demonstrated.

(3.) The high cost of producing milk when certain of our cultivated grasses, such as timothy, are used as the bulky fodder, is brought out by these trials very clearly.

Judged from the standpoint of the cost to produce 1 pound of butter, the various fodders tested rate as follows: Peas and oats silage, peas and oats green feed, corn silage, turnips and straw, wild hay and timothy hay. Peas and oats kept well as ensilage and, since the yield when weighed green will run from 10 to 12 tons per acre, the importance of this crop can not easily be overestimated. This crop vies with corn.

LACOMBE.

RESULTS OF FEEDING TRIALS.

—		Peas and Oats Silage.	Peas and Oats Green Feed.	Peas and Oats Silage.	Peas and Oats Green Feed.	Timothy Hay.	Peas and Oats Green Feed.	Turnips and Straw.	Peas and Oats Green Feed.	Prairie Hay.	Corn Silage.
Number of cows in experiment		19	20	20	20	20	19	18	18	17	17
Average weight at commencement of experiment	lb.	1,158·0	1,150·0	1,270·0	1,114·0	1,159·0	1,150·0	1,109·7	1,100·5	1,156·0	1,114·0
Average weight at finish of experiment	"	1,146·0	1,270·0	1,114·0	1,159·0	1,150·0	1,123·0	1,100·5	1,150·	1,114·0	1,145·0
Average gain or loss in weight	"	−12·0	120·0	−156·0	45·0	−9·0	−27·0	−9·2	49·5	−42·0	31·0
Number of pounds milk produced	"	1,891·3	2,287·9	2,199·5	2,167·4	2,285·9	2,130·2	2,000·4	2,017·7	1,829·5	1,803·9
Average milk per cow per day	"	14·2	16·3	15·7	15·4	16·3	16·0	15·9	16·0	15·37	15·15
Average per cent fat in milk	"	4·23	4·34	4·05	3·93	3·6	4·0	3·68	4·06	3·65	3·53
Total pounds fat produced	"	80·0	99·29	89·07	85·17	82·29	85·20	73·61	81·91	66·78	63·68
Average fat per cow per day	"	0·60	0·70	0·63	0·60	0·59	0·64	0·584	0·65	0·56	0·535
Total meal consumed	"	647·5	714·0	714·0	714·0	756·0	703·0	654·4	654·5	605·5	605·5
Total silage consumed (peas and oats)	"	5,236·0	....	6,300·0	....	....	....	....	....	....	....
Total green feed consumed	"	....	3,608·0	....	2,596·0	....	2,576·0	....	2,635·0	....	....
Total straw consumed	"	2,220·0	....	2,000·0	....	....	....	2,436·0	....	....	2,040·0
Total turnips consumed	"	....	....	....	....	....	....	8,100·0	....	....	....
Total prairie hay consumed	"	....	....	....	....	....	....	....	....	3,038·0	....
Total timothy hay consumed	"	....	....	....	....	4,655·0	....	....	....	....	....
Total silage (corn) consumed	"	....	....	....	....	....	....	....	....	....	6,330·0
Meal mixture consumed per 100 pounds milk produced	"	34·2	31·2	32·4	32·9	33·0	33·0	32·71	32·43	33·1	33·5
Meal mixture consumed per 100 pounds fat produced	"	809·0	1,020·0	801·0	838·0	919·0	825·0	888·9	799·0	906·0	950·8
Cost of meal at 1c. per lb.	$	6·475	7·14	7·14	7·14	7·56	7·03	6·544	6·545	6·05	6·05
Cost of silage at $3 per ton	$	7·85	....	9·45	....	....	....	....	....	....	9·50
Cost of green feed at $10 per ton	$	....	18·04	....	12·98	....	12·88	....	13·175	....	....
Cost of straw at $2 per ton	$	2·22	....	2·00	....	....	....	2·436	....	....	2·04
Cost of hay at $10 per ton	$	....	....	....	....	23·275	....	....	....	15·19	....
Cost of roots at $3 per ton	$	....	....	....	....	....	....	12·150	....	....	....
Total cost of feed	$	16·54	25·18	18·59	20·12	30·835	19·91	21·130	19·72	21·24	17·59
Cost to produce 100 pounds milk	$	0·87	1·10	0·84	0·92	1·34	0·93	1·056	0·977	1·16	1·97
Cost to produce 100 pounds fat	$	20·67	25·03	20·87	23·62	37·50	23·36	28·70	24·07	31·80	27·62
Cost to produce 1 pound fat	$	0·20	0·25	0·20	0·23	0·375	0·23	0·287	0·24	0·31	0·276
Cost to produce 1 pound butter	cts.	16·7	20·84	16·7	19·2	31·25	19·2	23·9	20·0	26·4	23·0

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DAIRY PRODUCTS.

The manufacture of cream cheese, butter, and Coulommier cheese was continued during the year. While no special demand has been created locally for the cream cheese, a small quantity has been sold in Calgary. One of the largest city dairies in Calgary, and another in Edmonton, have started the manufacture of cream cheese, and are offering this product through the medium of their delivery wagons to their customers daily. The fact that the work in connection with the manufacture of cream cheese was begun by this Station, was some inducement, at least, to both these dairies to commence the manufacture of a similar product, and thus develop a further outlet for the milk and cream for the dairy farmers of Central Alberta.

It is proposed to start the manufacture of small Cheddar cheese during the coming summer.

A part of the products of the dairy herd is sold as cream, bringing at present 36 cents per pound butter-fat, f.o.b., Lacombe.

LACOMBE.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

DAIRY CATTLE.

Breeding work has been continued during the past year with the same objects as heretofore. A number of the older grade cows have been sold to the butcher, having failed to come up to the standard of production set for the herd, viz., 7,000 pounds of milk and 200 pounds of butter-fat for a mature cow. There have been no losses from death during the entire year.

In the report for last year we mentioned that trouble had arisen from sore teats: this infection was believed to be carried upon a cake of soap, and on the proper use of liquid soap the trouble practically disappeared. This year the infection again appeared among the cows milked exclusively by one man, who, when not watched, neglected to wash his hands thoroughly. When this man left the Farm the trouble ceased to spread. We report this fact to emphasize the importance of a liberal use of soap and water by the milkers, and as a warning to others, because we know that a similar trouble exists in some herds in this country. In this connection also we should like to say something about the judicious use of that necessary instrument, the milk tube. Our experience has proved that, while there are occasions when its use is absolutely necessary, yet in the hands of a careless person it is very dangerous, being apt to cause both mechanical injury and bacterial infection.

Of the nineteen cows which have freshened and finished their lactation period since our last report, 68·4 per cent gave heifer calves, an increase of 18·4 per cent over last year's results. At the time of writing there are in all, sixty-one head of cattle, made up as follows: one bull under 4 years, one yearling bull, three mature cows, four heifers under 2 years, one heifer under 1 year, all pure-breds; in grades, twelve mature cows, nine heifers under 3 years, nineteen under 2 years, and eleven under 1 year.

The herd bull, although not a show animal, is of good size, weighing at 3 years and 10 months, 2,415 pounds (see illustration). He is getting strong, vigorous heifers, quite uniform in type. Two of his heifers have freshened and are producing very well at the present time. Their performance at 2 years is better than that of their dams at maturity, in the same stage of lactation.

The yearling bull that is being used on the heifers of the herd bull, is also of good size. At 15 months of age he weighs 1,240 pounds (see illustration). He is of the same blood lines as the herd bull on the sire's side. His maternal ancestors have been bred in British Columbia for many years, and are known producers. He was purchased as a 4-weeks-old calf from the herd of F. J. Bishop, Duncan, B.C.

As far as size and form is concerned the bull is leaving his mark on the herd. This is clearly shown in plates A, B, and C. Plate A shows cow No. 22 and her four heifer calves dropped on the Farm since 1912. The cow is a very ordinary, small, black-and-white spotted grade. The second heifer from the left is by an unknown sire; she is spotted like her dam, but tall and lanky. The third from the left is her daughter; the fourth is a daughter of the old cow, by the herd bull; as will be seen, she inherits colour from the dam, but size and form from the sire. The fifth, another daughter by the same bull, inherits both size and form, and, to a certain extent, the colour markings of the sire; and the sixth, though only a calf, shows clearly the colour markings of the dam, but the conformation promises to be like its sisters from the same sire.

In contrast to cow No. 22, an illustration is given of cow No. 16 (plate B), which is a cow of much better conformation and colour. Here the influence of sire is not so marked. The daughter of unknown sire, second from the left, is a much superior animal to that of No. 22. The grand-daughter, third from left, is also a finer heifer in every way than the grand-daughter of No. 22. Nos. 4 and 5 in this picture are comparable as regards age with Nos. 5 and 6 in plate A, and are of more desirable type, but do not show so great an improvement over the dam.

Plate C shows cow No. 14 and her progeny. This cow, although black and white, is a genuine "scrub" of fixed type. The daughter of unknown sire (second from left) is apparently no improvement on the dam. Her daughter, however, from a known sire, shows some improvement in colour and type. Nos. 4 and 5 from the left are daughters of the old cow by the herd bull, and although much larger and of somewhat better type than their dam, still show their "scrub" blood, both in form and colour.

These comparisons have reference only to size, colour, and conformation. As we have only three years' work to report upon, it is not possible to bring the performances into the reckoning. When these are available we shall have more evidence concerning the influence of the sire in improving production.

With regard to the nineteen cows which have finished their lactation period since the last report, we give a table showing the details of their performances. The list includes two pure-bred cows, Nos. 61 and 87, and two senior yearling grade heifers of unknown breeding, Nos. 29 and 36. The cost of food, as shown in the table, includes the food consumed while the cows were dry.

Dairy Records.

Cow No.	No. of days milked.	Total milk produced.	Average per cent. fat in milk.	Total amount fat produced in period.	Total amount meal consumed.	Total amount roots and silage consumed.	Total amount of hay consumed.	Months on pasture at $2.	Total cost of food for period.	Profit on product for period.	Cost to produce 100 lb. milk.	Cost to produce 1 lb. of butter.
		lb.	p.c.	lb.	lb.	lb.	lb.	Mos.	$ cts.	$ cts.	cts.	cts.
87	376	15,901·2	3·4	540·92	3,612	17,710	1,317	4	97 89	208 37	57·97	13·59
3	663	13,470·7	3·6	508·64	2,951	24,044	1,410	4	102 89	181 64	76·47	16·8
61	303	11,519·2	3·1	367·44	3,072	19,285	2,457	4	87 05	122 52	75·57	19·74
9	340	8,888·0	3·4	296·73	1,664	13,470	1,461	4	58 22	109 65	67·01	16·35
19	333	9,884·7	3·16	311·94	2,145	19,205	2,548	4	76 25	101 93	77·13	20·37
25	397	10,740·4	2·9	311·63	2,419	17,725	3,242	4	80 05	99 92	74·53	21·4
17	274	8,627·5	3·13	270·42	1,409	12,673	2,422	4	55 62	99 01	64·46	17·14
4	299	7,842·0	3·4	270·87	1,106	9,927	2,283	4	56 62	96 45	72·2	22·59
14	337	6,889·9	4·0	275·91	1,253	10,930	2,425	4	57 48	95 97	83·43	17·57
16	305	7,803·9	3·53	275·57	1,755	15,850	2,242	4	63 99	91 44	81·09	19·35
11	339	7,183·0	3·3	242·96	1,655	14,823	1,763	4	55 80	81 91	76·29	19·14
22	341	7,255·0	3·2	232·29	1,487	14,097	2,662	4	60 35	72 05	83·18	21·65
6	247	5,857·9	3·11	184·24	1,064	10,770	1,137	4	44 97	60 43	76·83	20·34
8	226	5,503·3	3·39	186·93	831	13,669	1,738	4	48 89	56 90	88·87	21·79
24	241	5,710·5	3·4	193·52	1,958	13,440	1,417	4	53 95	55 65	142·0	38·22
2	273	5,392·6	2·9	160·29	1,229	14,600	1,317	4	53 73	39 09	98·52	27·46
29	350	4,267·8	3·5	152·21	1,459	10,814	1,412	4	50 90	38 67	119·0	22·38
36	320	3,746·6	3·9	146·93	1,101	11,200	1,317	4	44 20	37 69	118·0	25·06
20	244	4,721·1	2·83	133·67	969	11,349	2,531	4	50 39	27 24	65·85	18·23

Agassiz.

From this list, for the sake of comparison, we have taken the records of the five most profitable and the five least profitable cows; also the performances of the five most profitable and least profitable of this year, as compared to the average of the last two years.

MOST PROFITABLE COW *versus* LEAST PROFITBLE COW.

1914–15.	Number of days milked.	Yield of milk.	Yield of fat.	Cost of food.	Profit over food.
		Lb.	Lb.	$ cts.	$ cts.
Five most profitable cows:—	376	1,5901·2	540·92	97 89	208 37
	663	1,3470·7	508·64	102 89	181 64
	303	11,519·2	367·44	87 05	122 52
	340	8,888·0	296·73	58 22	109 65
	333	9,884·7	311·94	76 25	101 93
Average	403	11,932·76	405·13	84 46	144 82
Five least profitable cows.	341	5,710·5	193·52	53 95	55 65
	273	5,392·6	160·29	53 73	39 09
	350	4,267·8	152·21	50 90	38 67
	320	3,746·6	146·93	44 20	37 69
	244	4,721·1	133·67	50 39	27 24
Average	285·6	4,767·72	157·32	50 63	39 67

Cow number.	Number of days milked.	Yield of milk.	Yield of fat.	Cost of food.	Profit over food.
		Lb.	Lb.	$ cts.	$ cts.
87	376	15,901·2	540·92	97 89	208 37
20	244	4,721·1	133·67	50 63	27 24

STATEMENT for three years.

Average of five cows.	Five most profitable cows.		Five least profitable cows.	
	1912–14. Average.	1914–15.	1912–14. Average.	1914–15.
Number of days in lactation period	331·5	403	285	285·6
Total yield of milk, Lb.	9,864·1	11,932·76	6,686·3	4,767·72
Total yield of butter-fat "	350·8	405·13	219·75	157·32
Total cost of food $	57·23	84·46	44·58	50·63
Total profit over cost of food $	129·5	144·82	73·18	39·67

AGASSIZ.

COST OF RAISING DAIRY HEIFERS.

We give again figures on the cost of raising dairy heifers throughout the year. The calves were started on whole milk, which by degrees was replaced by skim-milk. They were taught to eat a cheap mixture of grains as early as possible, and were given hay, roots, and silage as soon as they would eat them. Following are given the amounts of food consumed per month, and cost; also the gain in live weight per month.

COST OF RAISING DAIRY HEIFERS.

Month.	Weight.	Food Consumed.					Cost.
		Whole milk.	Skim-milk.	Grain.	Hay.	Silage Roots.	
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	$ cts.
1st	81	217	372	31	10	....	5 51
2nd	140	150	360	30	10	300	4 87
3rd	200	49	372	77	70	310	3 26
4th	245	150	300	46	82	51	4 76
5th	260	....	....	31	84	226	1 16
6th	310	....	....	93	170	450	2 78
7th	365	....	....	81	156	464	2 67
8th	415	....	....	80	160	537	3 15
9th	440	....	....	50	170	450	2 23
10th	520	....	....	62	254	676	3 20
11th	555	....	....	70	216	624	3 10
12th	625	....	....	77·5	132	932	3 09
Total	....	566	1,404	728·5	1,514	5,020	39 78

This is the average of a group of grade heifers which were kept on skim-milk for four months only. On account of the experimental work in the herd, there was some irregularity in the kinds of grain and roughage supplied each month; in fact, the ration was changed in at least one constituent every two weeks from October to March. In spite of this they averaged 1·5 pound daily gain from birth, at a cost of 7·3 cents per pound, which is exactly 1 cent higher than those raised last year. The daily gain, however, is the same as last year's heifers, which were not hampered by experimental work.

EXPERIMENTAL FEEDING.

Conditions were not altogether favourable for experimental work, since many of the cows were far advanced in their lactation periods. However, three trials were made with the entire milking herd: these consisted of tests of soy bean meal and cocoa bean husks as foods for milk and butter production. Another test was made of clover silage versus corn silage for the production of milk and butter.

Trial 1.—Soy bean meal compared with oil cake for milk and butter production.

This trial lasted over a period of twelve weeks. The foods were fed in combination with wheat bran and brewers' grains in equal parts in these experiments. The rations were always mixed in the following proportions: five parts by weight of wheat bran; five parts by weight of brewers' grains; two parts by weight of oil cake, soy bean, or cocoa bean husks.

The roughage fed consisted of: Corn silage, 2 parts; mangels, 2 parts; clover hay (chaffed), 1½ part, by weight. This mixture cost $5.25 per ton; the cattle were given all that they could consume twice daily.

The cattle were run through six periods of two weeks each; in periods 1, 3, 5, and 7, they received linseed oil cake, and during periods 2 and 6 soy bean cake was fed. In the following protocols the details of each period are given in tabulated form.

TRIAL 1.—Oil Cake *versus* Soy Bean Meal.

—		Oil Cake Meal.	Soy Bean Meal.
		Periods 1, 3, 5, 7 Average.	Periods 2 and 6. Average.
Number of cows in test		15	15
Average milk per cow per day,	Lb.	21·21	20·49
Average per cent fat in milk		3·17	3·09
Average pounds fat per cow per day	Lb.	0·6577	0·6345
Mixture consumed for 1 pound fat produced	"	10·95	11·68
Mixture consumed per 100 pounds milk produced	"	34·74	36·16
Roughage consumed per 100 pounds milk produced	"	1,253·53	2,554·58
Roughage consumed per pound fat produced	"	79·83	82·56
Nutritive ratio of total ration		1:4·84	1:4·87
Total cost of food	$	23.35	23·61
Cost to produce 1 pound fat	"	0·35	0·36
Cost to produce 1 pound butter	"	0·29	0·30
Profit on 1 pound butter at 40 cents	"	0·11	0·10
Cost to produce 100 pounds milk	"	1·10	1·13
Profit on 100 pounds milk at $1.80	"	0·70	0·67

From these figures it will be seen that linseed oil cake gave slightly better results. When both foods are purchased at the same price, it would appear better, from the point of view of production, to feed linseed oil cake than soy bean cake.

Trial 2.—The value of cocoa bean husks compared with linseed oil cake for milk and butter production.

The cocoa bean husks is a by-product from chocolate factories. It looks very much like the brown husk from peanuts, but it has a pleasant chocolate odour. The material used was analysed by Dr. Frank T. Shutt, Dominion Chemist, Ottawa, who reports the following:—

	Per Cent.
Moisture	6·44
Crude protein	15·89
" fat	11·
Carbohydrates	43·35
Crude fibre	15·10
Ash	8·22
	100

Fertilizer constituents:—	Per Cent.
Nitrogen	2·54
Phosphoric acid	1·01
Potash	2·80

It will be noted that the husks contain liberal quantities of crude protein and fat. There is also a high crude fibre content, as compared with ordinary concentrates in common use.

AGASSIZ.

The husks were ground finer than ordinary bran, and mixed with brewers' grains and wheat bran in the proportion of 2 : 5 : 5 by weight. They were used to replace an equal weight of linseed oil cake. At first the cows did not like it very well, but in a few days they became accustomed to the odour and ate the food readily. Only six weeks could be given to this trial, but from the work done we conclude that the husks are not as valuable for food as linseed oil cake, even when they can be purchased for $20 per ton as compared with $35 per ton for oil cake.

The following figures will illustrate the results obtained:—

TRIAL 2.—Oil Cake *versus* Cocoa bean husks.

—		Oil Cake Meal. Periods 3 and 5. Average.	Cocoa Bean Husks. Period 4.
Number of cows in test		17	17
Average milk per cow per day	Lb.	20·26	18·09
Average per cent fat in milk		3·18	3·44
Average pounds fat per day per cow	Lb.	0·645	0·62
Mixture consumed per pound fat produced	"	11·25	11·64
Mixture consumed per 100 pounds milk produced	"	35·84	39·99
Roughage consumed per pound fat produced	"	80·945	86·64
Roughage consumed per 100 pounds milk produced	"	267·64	297·53
Nutritive ratio of total ration		1:4·83	
Total cost of food	$	27·38	26·72
Cost to produce 1 pound fat	"	0·35	0·36
Cost to produce 1 pound butter	"	0·297	0·301
Profit on 1 pound butter at 40 cents	"	1·03	0·009
Cost to produce 100 pounds milk	"	1·14	1·24
Profit on 100 pounds milk at 18 cents	"	0·66	0·56

It will be seen that the flow of milk decreased over 2 pounds per day per cow when the husks were fed; also that the yield of fat per cow per day was slightly less. Although the total cost of the food was less when the husks were fed, the cost to produce 100 pounds of milk or fat was increased. If the husks could be purchased for $10 per ton, and carriage charges were not too great, one could afford to feed a limited quantity.

Trial 3.—Clover silage compared with corn silage for milk and butter production.

We have made several attempts at this Farm to put up a clover silage which would be a satisfactory dairy food, and this year the attempt has been fairly successful. It was put up at first without being chopped, and the results were not good. The silage did not cure well and at feeding time was hard to handle, and the odour was objectionable. It was unfit to use in a dairy stable. Another season it was chopped in 1 inch lengths and well tramped into the silo. In this form it proved superior to the unchopped silage, because the odour was not so strong and the flavour was better.

Last season, over 124 tons were put in. It was cut in ½-inch lengths. While the silo was being filled, some water was added at intervals and the clover very firmly tramped down. The result of this procedure was good. The clover cured well. The odour was not stronger than ordinary silage, and the flavour was apparently good, because the silage was readily eaten by the stock. The quality of the raw material was the poorest which we have used. There was a small amount of rye grass and some bracken mixed in. The clover has always been harvested when in bloom.

AGASSIZ.

In this trial the clover silage just described was tested against corn silage of good quality, grown the same season as the clover. The corn was harvested in the soft dough stage, and was cut in ½-inch lengths.

The trial lasted six weeks. The roughage consisted largely of silage, being mixed with mangels and cut clover hay in the following proportions: Silage, three parts, by weight; cut hay, one part, by weight; mangels, one part, by weight.

The cows were given all they would consume of this mixture.

The grain fed along with this roughage consisted of: Wheat bran, ninety-six parts; linseed oil cake, thirty-six parts; cocoa bean husks, one part. The following figures show the results which we obtained:—

TRIAL 3.—Clover silage *versus* Corn silage.

		Corn Silage.	Clover Silage
		Periods 8 and 10, average.	Period 9.
Number of cows in test		16	16
Average milk per cow per day	lb.	19·61	18·53
Average per cent fat in milk		3·33	3·4
Average pounds fat per cow per day	lb.	·671	·629
Meal mixture consumed per pound fat produced	"	10·68	10·62
Meal mixture consumed per 100 pounds milk produced	"	35·7	36·8
Roughage consumed per 100 pounds milk produced	"	276·6	283·2
Roughage consumed per pound fat produced	"	82·8	83·4
Total cost of food	$	25·26	23·70
Cost to produce 1 pound fat	$	·335	·336
Cost to produce 1 pound butter, at 40 cents	$	·268	·269
Profit on 1 pound butter, at 40 cents	$	·132	·131
Cost to produce 100 pounds milk	$	1·12	1·14
Profit on 100 pounds milk, at $1.80	$	·68	·66

From these figures it will be seen that with the conditions in which we were working, this season at least, there is not a great deal of difference between the two forms of silage for milk and butter production. The advantage, where any is shown, is in favour of corn silage. This advantage can be accounted for, we think, by the fact that the corn silage is more palatable than the clover silage. Although the clover was eaten by the cows as if they liked it, they showed more eagerness for the corn, and they consumed a larger quantity of it than they did of clover silage.

More work will be done another season with other crops of the same material, to see whether this year's results will be repeated.

SUMMARY.

(1) From the evidence obtained in trials made this season, we would recommend linseed oil cake in preference to soy bean meal, even when combined with nitrogenous foods, such as wheat bran and dried brewers' grains.

(2) If cocoa bean husks could be purchased cheaply, they could be used to a limited extent to replace higher priced grains in a succulent ration.

(3) If clover is cut when in bloom and properly made into silage, it is a valuable form of winter food for dairy cows.

AGASSIZ.

CALF-REARING TRIALS.

Owing to the difficulty of not having a sufficient number of heifer calves to work with, each group was small. It must be kept in mind, therefore, that differences in results with so few animals might be due to the individuality of the calves used, and not entirely to the different foods. The calves used were all grade Holsteins.

The object of the experiment was to compare two ordinary substitutes for skim-milk, Blatchford's calf meal and linseed oil cake. The calf meal was fed according to the directions given by the manufacturers. All the calves were fed on whole milk for the first fourteen days, this being charged to them at the rate of $1.80 per hundred pounds. As soon as they would feed, they were given a roughage mixture consisting of: Clover hay, fifteen parts, by weight; mangels, twenty parts, by weight; corn silage, twenty parts, by weight. This mixture cost 26 cents per cwt.

The grain mixture, of which they were given as much as they would eat, was as follows: Ground oats, two parts; wheat bran, two parts; ground corn, two parts; linseed oil cake, one part. This mixture cost $1.62 per cwt.

Skim-milk was charged at 25 cents per cwt., linseed oil cake at $1.75 per cwt., and Blatchford's calf meal at $4 per cwt.

The results of this limited trial are given in the following table:—

CALF FEEDING TRIALS.

		Lot I.	Lot II.	Lot III.
		Linseed oil Cake.	Blatchford's Calf Meal.	Skim-milk.
Number of heifers in test		2	2	3
Total weight at birth	lb.	176	175	266
Average weight at birth	"	88	87·5	88·5
Total weight at 14 days	"	210	222	363
Average weight at 14 days	"	105	111	121
Total weight at end of period	"	372	364	621
Average weight at end of period	"	186	182	207
Total gain during feeding period	"	196	189	355
Average daily gain per calf during feeding period	"	1·325	1·038	1·39
Average duration of feeding period	"	74	91	85
Amount of roughage fed	"	441	886	978
Amount of grain fed	"	114	226	248
Amount of whole milk fed	"	552	213	814
Amount of skim-milk fed	"	781	195	1,642
Amount of test food fed	"	102	291	....
Cost of roughage fed	$	1·15	2·30	2·54
Cost of grain fed	$	1·85	3·66	4·02
Cost of whole milk fed	$	9·40	3·83	14·65
Cost of skim-milk fed	$	1·95	·49	4·10
Cost of test food fed	$	1·78	11·64	....
Total cost of food fed during period	$	16·13	21·92	25·31
Amount of roughage fed for 100 pounds gain	lb.	225	268·7	275·49
Amount of grain fed for 100 pounds gain	"	58·16	119·57	69·86
Amount of whole milk fed for 100 pounds gain	"	266·32	112·7	299·3
Amount of skim-milk for 100 pounds gain	"	398·47	108·47	463
Amount of test food fed for 100 pounds gain	"	52·04	153·96	....
Cost to produce 100 pounds gain	$	8·23	11·60	7·13

We have few comments to make with so limited a trial, but the work will be repeated this winter with a larger number of calves. Although lot 3, fed skim-milk, contained three calves to two each in the other lots, one of these was a weakling, and it was therefore thought inadvisable to use this animal with the milk substitutes. All the calves appeared to be in healthy growing condition. Those receiving skim-milk made the most profitable gains, those getting linseed oil cake came next, and those fed Blatchford's calf meal, third.

AGASSIZ.

DAIRY WORK FOR YEAR 1914.

The dairy work has been considerably interrupted on account of the repairs and alterations which have been made with a view to increasing the facilities for cheese-making, and enlarging the storage capacity of the dairy.

We have now a good cheese-making room, drying-room, and three small curing-rooms, partly underground, which gives us cellar temperatures. This gives us a building which is properly insulated, and is suitable for the making of Cheddar, Stilton, and soft, as well as ripened, cheeses.

With the conditions prevailing in our old dairy we have found the following methods best for making Camembert, Stiltonette, small Cheshire, and Coulommier cheeses. In all, difficulty was experienced in preventing too great evaporation during ripening. This was owing to the fact that the season was exceptionally dry, and the curing-room too warm.

CAMEMBERT.

The lack of moisture here was supplied by wrapping the cheeses in moistened parchment paper; they were then inclosed in boxes, where they matured. The finished product retains 45 to 50 per cent moisture.

June 11.—15 pounds milk, 2·5 c.c. starter (made from centre of a well-ripened cheese). Temperature: milk 82°; making room 68°. Milk inoculated 10.15 a.m. Milk renneted 2.15 p.m. Curd moulded 6 p.m. Three cheeses obtained from this weight of milk.

June 12.—Cheese turned, salted, and demoulded.

June 15.—Taken to curing room.

June 26.—Boxed.

July 11.—Ready for market. Good flavour and texture. This method was found to give a product true to type and fairly uniform.

STILTONETTE.

A small cheese, resembling the imported Stilton and weighing when ripe from 1½ pounds to 1¼ pounds according to age. It may be used at 2 months, but a well made cheese improved in flavour up to 4 or even 5 months. The milk should test not less than 3·5 per cent.

May 26.—20 pounds milk (sweet), one-half pint starter having acidity 0·64, 3 c.c. rennet. Temperature: milk, 85°; Room, 66°. Milk inoculated 12 o'clock noon. Milk renneted 12·10. The method followed was practically the same as for the full-sized Stilton, except that pressure up to 4 pounds was used.

July 30.—This cheese was ready for market. Texture: soft, loose, and crumbly. Green veined all through. Weight 1½ pounds. A good reproduction of Stilton.

SMALL CHESHIRE.

A mild-flavoured cheese, weighing about 2 pounds when ripe. It resembles in flavour and texture the English Cheshire, but the process is not the same. The protocol of a good specimen is given below.

July 21.—25 pounds sweet milk (acidity at time of renneting, –0·18), 3 c.c. rennet. Temperature: milk, 88°; room, 68°. Renneted 11.15 a.m. Cut into ¾-inch cubes, 12.45 noon. Ladled 1 o'clock p.m. on to two racks with cloths over. Once during the afternoon curd was scraped from the cloth to facilitate drainage. It is important that the whey be drained off quickly. Moulded, 8 p.m. Turned at once. Turned 11 p.m. A 5 pound weight put on.

July 22.—A.M., pressure increased to 14 pounds. Removed at noon. P.M., 1½ ounces salt rubbed in. Hoop replaced.

July 24.—6.15 a.m., put to soak in strong brine; 2 p.m., removed from brine, bandaged.

July 26.—Taken to curing room. Turned daily.

August 18.—Ready for market. Flavour: mild, rich, and mellow. Texture loose and open.

Coulommier was made all through the season until November, together with a small quantity of cream cheese. No cheese work was done between November and February, owing to alterations in the dairy building.

During October and November some experiments were made with *B. bulgaricus* as a starter for butter- or cheesemaking. It was found that sterilized skim-milk inoculated with this organism, and kept at a temperature of 90° to 100°, made a useful starter. The organism was obtained from Park, Davis, contained in small tables.

Besides the cheese work, butter was made throughout the year. A considerable amount of official testing for the pure-bred cows has been done, and composite samples from each individual animal have been tested five times per month. The number of farmers who are availing themselves of the opportunity of having their milk tested at this dairy has greatly increased this year, and we are now testing samples from a considerable number of herds each month. Though this entails some extra work, the expense is justified by the increased interest shown by the owners of herds in the district served by the Farm.

HORSES.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN,

E. S. ARCHIBALD, B.A., B.S.A.

The horses on the Central Experimental Farm, as in previous years, have been maintained largely for labour purposes. A start was made in breeding work in the fiscal year ending March, 31, 1913. Five mares proved to be in foal. One of these mares was sent to the Experimental Station at Lennoxville, Que. The other four mares, unfortunately, overran their time from two to four weeks. The foals were all extremely weak, and died within twenty-four hours in spite of the very best care that could possibly be given. The conditions which influenced this most peculiar series of accidents were carefully studied by the Health of Animals Branch, but, to date, no solution has been found. The mares were working regularly, and were in first-class breeding condition at the time of foaling. These mares have again been bred, and it is to be hoped that during the coming fiscal year better results may be obtained.

There are now on the Central Experimental Farm, twenty-six head of horses, made up as follows: Thirteen heavy draught grade Clydesdale geldings, four pure-bred Clydesdale mares, four grade Clydesdale mares, two expressers, two light driving horses, one Clydesdale stallion colt 2 years of age.

I regret to report the loss of two pure-bred Clydesdale mares during the year. Both of these mares were young and, although worked regularly, were in fairly good condition; yet, owing to a predisposition to stomach trouble, they succumbed in spite of the very best care and treatment. This heavy loss has, unfortunately, converted the usual credit balance in the horse statement into a debit balance.

Particular credit in the care and management of the horses is due to the farm foreman, Mr. D. D. Gray, who has the direct care of this class of stock; and also to the stableman, Mr. John Nevins, whose interest and untiring attention is shown in the condition of the horses in spite of the heaviest year's work in the history of the Farm.

HORSE LABOUR.

The twenty-two heavy draught mares and geldings on the Farm are expected to do all the work, not only on the 200-acre farm, but, in addition, to supply the necessary labour to the Horticultural, Cereal, Poultry, Agrostology, Botanical, and other Divisions. In addition, a large amount of hauling and cartage in connection with all the divisions, as well as roadmaking, messenger service, and the like, takes up much of their time. A great deal of horse labour was necessary during the past year in the hauling of materials for the new cattle barns, as well as grading and cleaning up about these buildings. Following is a detailed statement of the horse labour for the past fiscal year.

During the year April 1, 1914, to March 31, 1915, the work done by horses kept in the stables was equivalent to 7,174 days' work, distributed as follows:—

	Days.
Live stock, hauling feed, milk, etc.	277½
Farm work (200-acre farm)	2,089½
Manure on 200-acre farm	461
Horticultural Division and lawns	1,059½
Cereal Division	670½
Poultry Division	59
Agrostology Division	50
Exhibition Division	31½
Bulletins to and from offices	49
Botanical Division	158½
Omnibus service and supervision of work	1,460
Care of roads on farm	50
Various, including hauling freight, sidewalks, buildings, etc	758
Total	7,174

FEEDING THE WORK HORSES.

The feeding of the work horses was conducted along the same lines as in former years. Readers desirous of discovering the hours of feeding, varieties and quantities of feeds given, rates of feeding for different weights of horses, and the like, are referred to the report for the Fiscal Year ending March 31, 1914.

FINANCIAL STATEMENT FOR HORSES.

Below are submitted the inventories and returns from horses on the Central Experimental Farm during the year April 1, 1914, to March 31, 1915.

—	April 1, 1914.		March 31, 1915.		Returns from Labour.	Gross returns including decreased value and labour and manure.
	No.	Value.	No.	Value.		
		$		$	$	$
Horses	27	9,925 00	26	9,375 00	5,021 80	4,641 80

Returns.

By 7,174 days' labour at 70 cents	$5,021 80	
170 tons manure at $1	170 00	
Gross returns		$5,191 80

Expenditures.

To decreased value of horses	550 00	
Cost of feed and bedding	2,525 00	
Purchases	1,025 00	
Shoeing of horses	35 50	
Labour, stableman	725 00	
Harness and repairs	375 50	
Gross expenditures		5,561 00
Net debit balance against horses		369 20

OTTAWA.

EXPERIMENTAL STATION, CHARLOTTETOWN, P. E. I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

HORSES.

A team of Clydesdale mares was purchased in the spring of 1914 for breeding purposes. They were bred to "Baron Kelvin," and "Darling of Taunton" is now carrying a foal. During 1914 a large percentage of the foal crop in Queen's county was lost. In some sections many mares also died. The trouble apparently was contagious abortion and the complications that frequently accompany that disease. The grade Clydesdale mare at the Station aborted a still-born foal on May 10, one month before her time was up. Nothwithstanding every effort that was made by the veterinarian and the men on the farm, she died of blood poisoning on the 12th of May. A team of draught mares and a team of geldings were kept for labour purposes. One gelding was used for light work and driving.

CLASSIFICATION OF LABOUR.

The labour performed by the horses during the fiscal year was as follows:—

	Hours.
Farm work	7,901
Horticulture	356
Roads	372
Hauling manure	1,673
Draining land and hauling tile	545
Messenger service	1,264

FEEDING.

During the heavy work the draught horses were fed as follows: 13·3 pounds hay, 6·6 pounds oats, and 2 pounds bran per 1,000 pounds live weight; and during light work, about 14 pounds hay, 4 pounds oats, and 3 pounds bran per day. Roots were fed as required.

Three draught mares that were working part of the time were fed natural grass hay and a meal mixture consisting of about equal parts of oats and bran for the three winter months of January, February, and March. The hay was valued at $7 per ton, although it was apparently not as good as good oat straw. The oats and bran were valued at $26 per ton and the roots at $2 per ton.

WINTER Feeding of Horses.

Name.	No. of days.	Amount of work.	Feed Given.				Cost of Feed.	Weight Jan. 1.	Weight Mar. 31.	Gain or loss.
			Hay.	Oats.	Bran.	Roots.				
	Dys.	Hours.	Lb.	Lb.	Lb.	Lb.	$	Lb.	Lb.	Lb.
Mattie	90	59	1,413	472	480	207	17·51	1,455	1,505	50
Kate	90	254	1,413	510	486	207	18·09	1,435	1,470	35
Nell	90	524	1,422	586	495	207	19·22	1,470	1,455	[1]15

[1]Loss.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

HORSES.

There are at present eleven horses kept at this Farm, including eight heavy horses which are used for heavy work in all departments, as well as miscellaneous trucking. Two are pure-bred Clydesdale mares purchased in the spring of 1913 with a view to raising colts. Though bred last year they did not prove in foal. However, they will be bred again this coming season.

The three lighter horses are used for express work, cultivating gardens, spraying, mowing lawn, and driving. The brown mare "Princess," who had the misfortune to injure her fetlock, was exchanged for a nice 3-year-old mare for express work, as the old horse "Jim" is now too slow for the road, but can be used to advantage on the cultivator and lawn mower. The third light horse is used for driving purposes.

EXPERIMENTAL STATION, KENTVILLE, N. S.

REPORT OF THE SUPERINTENDENT, W. S. BLAIR.

HORSES.

Seven horses have been kept during the past year. These were fed during the winter on the following grain mixture: 150 pounds bran; 150 pounds cracked corn; 150 pounds crushed oats.

Twelve pounds of this mixture is fed to each draught horse, and 9 pounds to the driving horse. Each horse receives 18 pounds of hay per day, with a few carrots. During February and March one pint of feed molasses was fed to each horse per day.

After the 1st of April the feed is gradually increased and a ration composed of 300 pounds crushed oats and 100 pounds bran is given at the rate during the spring and summer of 18 pounds per day for each draught horse.

The winter ration as outlined above keeps the horses in good condition but, for heavy horses and with much work, it is not sufficient and should be increased in order to keep the teams in good flesh.

OXEN.

Three pair of heavy oxen were worked during the summer. Their feed while working was a mixture of 100 pounds crushed oats and 100 pounds corn meal, fed at the rate of 10 pounds per day in three feeds. Twenty-five pounds of hay was consumed by each per day.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

HORSES.

There were twelve draught horses at the beginning of the year, of which three were pure-bred imported Clydesdale mares, five Clydesdale grade mares, two Percheron grade mares, and two draught bred geldings; and a Standard bred Morgan cross-bred driving mare. A general purpose mare of 1,200 pounds weight was bought in May. A pure-bred Clydesdale mare, a grade Clydesdale mare, and both Percheron grade mares foaled. The foal from the pure-bred Clydesdale mare died when 3 days old, from pneumonia, and one of the grade Percheron foals died at 3 months of age, from the same disease. The grade Clydesdale colt weighed, when 1 year old, 920 pounds, at a food cost of $36.75, and the Percheron grade filly, 875 pounds, at a food cost of $35.

The twelve draught horses and mares weighed from 1,550 to 1,775 pounds each in normal working condition.

The average cost of feeding these horses for the year was $149, and shoeing and stable supplies averaged $15 each, a total of $164.

Their ration was the same as reported last year, with the exception of two mares that were fed from December 20 to March 20, one on hay, straw, and turnips, the other on hay, straw, and carrots.

Their daily ration from May 1 to November 1 was as follows Whole oats, 15 to 16·5 pounds; bran, 2 to 3 pounds; hay, 15 to 20 pounds.

During November the grain ration was slightly reduced, and from 5 to 10 pounds turnips was added.

The horses worked steadily ten hours per day for eight months and five hours per day for four months, and kept in good flesh.

The pure-bred Clydesdale mare "Gertie," 9 years old, and her mate, a grade Clydesdale mare "Queen," 8 years old, both being non-pregnant, were gradually reduced in their grain ration during December until on the 20th they began a three-months term of feeding without grain, getting 15 pounds of hay and 15 pounds of oat straw daily. In addition, "Gertie" took 15 pounds of turnips and "Queen" 15 pounds of carrots daily.

Experiment in Winter Feeding.

——	Weight Dec. 20.	Weight Mar. 20.	Loss in Weight.
	Lb.	Lb.	Lb.
Gertie	1,575	1,460	115
Queen	1,625	1,535	90

These mares did no work, but were given a yard run daily. They maintained excellent health, and the cost of feeding for the three months was as follows:—

Gertie.

Hay,	1,350 pounds at $10 per ton	$	6 75
Straw,	1,350 " at $6 per ton		4 05
Turnips,	27 bushels at 8 cents per bushel		2 16
			12 96

Queen.

Hay,	1,350 pounds at $10 per ton	$	6 75
Straw,	1,350 " at $6 per ton		4 05
Carrots,	27 bushels at 10 cents per bushel		2 70
		$	13 50

At the close of the experiment they were gradually brought back again to a full grain ration, and were given light work during the transition.

Based on the earning power of each horse being 70 cents per day, the Station horses each earned $140 from April 1 to November 30, and from December 1 to March 31, half time, $32.90; a total earning power of $172.90 at a cost for feed, shoeing, stable supplies, etc., of $164 each. Had it, however, been necessary to hire the Station work done, at prevailing rates for team hire, each horse employed would have cost in wages $1.40 per day and, instead of crediting up a profit of only $8.90 per horse for the year, there was a saving to the Station, by using its own horses, of $172.90 per horse, for which credit might properly be given.

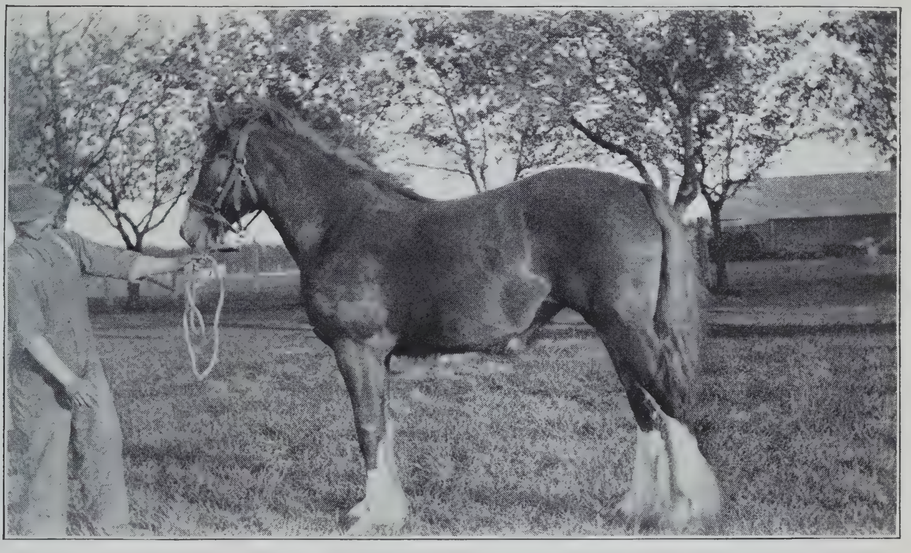
FREDERICTON.

Four Registered Clydesdale mares of Experimental Station, Lennoxville, P.Q., 1915.

16—1916—30a.

Group of French-Canadian horses Experimental Station, Cap Rouge, Que.

Brandon : Line-up of Farm work-horses.



Experimental Farm, Indian Head, Sask. Clydesdale 12 months Filly "Bonnie Jean Bruce".

Experimental Farm, Indian Head, Sask. Group of Clydesdale mares. From left to right: No. 1, 7 years; No. 2, 4 years; No. 3, 6 years; No. 4, yearling filly.

16—1916—30b.

Two year old Fillies, ran out every day all winter. Experimental Station, Lacombe.

Agassiz, B.C. Clydesdale colts helping prepare the corn land.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

HORSES.

The horses are kept for labour purposes only. Four horses have been purchased during the year to carry on the new work on the increased acreage of the farm. The horses now at this Station number eleven head, comprised of one registered Canadian mare weighing 1,060 pounds and five teams of draught horses weighing, respectively, 2,550, 2,680, 2,800, 2,975, and 3,200 pounds each pair. In addition to the routine work on the farm, these horses are used for breaking new land, clearing away stones, and hauling building materials.

The grain ration given to the horses consisted of a mixture of oats and wheat bran, in the proportion of 1 part of bran to 5 parts of oats. This was fed at the rate of one-half to one pound for every hundred pounds weight of the horses. The wheat bran was decreased and the oats proportionately increased when the horses were put on extra heavy work.

The hay fed was a mixture of clover, timothy, and couch-grass. The working horses, excepting those on experiment, were given all the hay they would clean up. The total amount of hay eaten by four teams of horses on light but steady work during the six winter months would seem to indicate that the proportion of a little less than 1 pound of hay for every hundred pounds of weight of the horses is a fair average.

ECONOMICAL WINTERING OF HORSES.

An experiment bearing on the economical wintering of a pair of draught horses was conducted during the winter, from November 1 to March 31. During the month of November the horses were gradually changed from the regular ration to the experimental ration, and in April they were gradually brought back again to the regular ration. These two months were considered only as periods of transition.

The work done by these horses was exactly the same each day. They were used for delivering milk to the customers, a walk of about 2½ miles per day. The horses were tied and could not get any feed but what was charged to them. The bedding consisted of shavings, so as to make sure of this.

One pound of mixed hay (clover and timothy), 1 pound of good quality oat straw, and 1 pound of swede turnips was given to each horse for every hundred pounds of his weight, to which was added 1 pound of wheat bran per horse per day.

Every morning their mangers were cleaned out, and the feeds left over were carefully weighed once a week. The total amount of feeds thus removed in the 121 days was as follows:—

	Pounds.
No. 1—	
Hay	28
Straw	45
Swedes	380
No. 2—	
Hay	36
Straw	80
Swedes	460

The swede turnips were of good quality, but did not appear to be relished by the horses. They were consumed with aversion, especially at first. Horse No. 1 lost 2 per cent of his weight during the winter, and No. 2 lost 2½ per cent. The health of these two animals was perfect throughout the winter, and their energy and appearance did not fail them.

This experiment will be duplicated during the coming winter and, if possible, with the same horses. The swede turnips will be replaced with beets and carrots, which are decidedly superior for the feeding of horses.

STE. ANNE DE LA POCATIÈRE.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

HORSES.

There are now nineteen horses at the Station: fourteen registered French Canadians—nine mares, two 2-year-old fillies, one yearling stallion, 2 weanlings; also two teams of from 2,600 to 2,900 pounds weight, and a driver. They have all been, and are now, in very good condition. These horses are kept for work, experimental feeding and housing, and to sell high-class breeders at a reasonable figure.

HORSE LABOUR.

Leaving the young things out, also a mare kept idle nearly six months for experimental purposes, there were fourteen horses kept for work, and the following figures show what they were employed at:—

	Hours.
Farm work	11,909
Live stock, hauling feed, bedding, water	2,367
Care of grounds and roads	849
Horticultural Division	755
Bee Division	98
Poultry Division	91
Exhibitions, ten horses shown	1,056
Hauling manure from outside	6,081
Clearing land	20
Draining	32
Maintenance of equipment	168
Waterworks, construction	1,083
General supervision, messenger service, odd jobs	2,824
Buildings, construction and repairs	735
Fences, repairs	38
Fuel, hauling coal and wood	200
	28,306

This was an average of over 200 full days of ten hours per horse, for the year. There were two brood mares and a filly in the lot, so that the horses were fairly well employed all through the year.

EXPERIMENTAL FEEDING OF HORSES.

WINTERING A HORSE AT LOW COST.

This question of wintering horses at a low cost and still have them fit to perform their work in the spring, is quite an important one, as in most cases a farmer cannot utilize all his teams in the winter time. For the fourth year in succession, this experiment has shown that a horse, doing nothing, can be kept in good shape by receiving 1 pound of rough hay, 1 pound of oat straw, and 1 pound of carrots or swedes per hundred pounds of live weight. In 1914-15, a pure-bred French Canadian mare, 11 years old, was used for the experiment, which lasted 151 days, from November 1, 1914 to March 31, 1915. This mare was chosen because she was the lightest in the stable,

heavier horses having been used the three previous winters, but the result was the same. She weighed 1,055 pounds at the beginning of the experiment and exactly 1,100 pounds at the end. A little trouble was experienced with her, because she refused to eat the swedes, and molasses had to be used to make her take the roots. She liked carrots very well, and she ultimately had to be given them instead of turnips. This shows that carrots are *the* roots for horses, and that, when at all possible, they should be grown for this purpose instead of swedes.

During the 151 days, the mare ate the following quantities of feed:—

FEED eaten during 153 days by an idle mare weighing 1,055 pounds.

Feed.	Quantity.	Price per ton.	Price per pound.	Cost.
	Lb.	$	cts.	$ cts.
Rough hay	1,530	7 00		5 35
Oat straw	1,332	4 00		2 66
Swedes	654	2 00		0 65
Carrots	336	2 00		0 34
Oats	213		1·5	3 20
Bran	12		1·0	0 12
Molasses	66		2·0	1 32
Total cost				13 64

This mare had to be worked hard until the experiment commenced, on November 1, 1914, so that oats and bran were given to her for a month, as the work was gradually decreased. And right here, it is well to say that this is essential: to slowly cut down the work and feed in the autumn and increase both, little by little, in the spring.

The following table may be interesting, as it shows the results of four years:—

COST of wintering idle horses—Summary of four years.

Winter.	Length of experiment.	Weight at beginning.	Weight at end.	Gain in weight.	Loss in weight.	Cost of feed.
	Days.	Lb.	Lb.	Lb.	Lb.	$ cts.
1911-12	152	1,375	1,395	20		16 25
1912-13	151	1,350	1,445	95		16 96
1913-14	151	1,150	1,135		15	10.99
1914-15	151	1,055	1,100	45		13 14
Average for four years.	151	1,232	1,269	37		14 33

From the above it will be seen that horses weighing around 1,250 pounds can be fed, idle, for a little less than 10 cents per day, on a pound each of rough hay, oat straw, and carrots or swedes, per hundred pounds live weight, valuing the above feeds respectively at $7, $4, and $2 per ton.

By "rough hay" is meant hay made in good shape, not musty or mouldy, but from any grass or weed which horses will eat.

CAP ROUGE.

COST OF RAISING HORSES.

Feed of a Yearling.

It is well to say here that in calculating the cost of raising horses, only the feed of the youngsters is taken into account, nothing being allowed for feed or care of dam, stallion fees, care of colts, interest, depreciation, or housing. And it must also be remarked that no attempt is made to see how cheaply a young horse can be kept, but, on the contrary, every possible effort is made to develop the colts as rapidly as possible, as there seems no doubt that it is the only way to assure proper growth and usefulness for the future.

Last year, all feed given to a colt dropped on May 31, 1913, was weighed, and the total cost, until April 1, 1914, was $27.51. During the following twelve months, this young stallion ate the following quantities of feed:—

FEED eaten from April 1, 1914, to March 31, 1915, by a yearling Stallion.

3,030 pounds hay at $7 per ton..	$10 60
2,261 " oats at 1½ cents per pound..	33 91
1,564 " bran at 1 cent per pound..	15 64
91 days pasture at $1 per month..	3 03
Cost for one year..	$63 18
Total cost, when 22 months old..	$90 69

During the year, the colt gained 340 pounds, or nearly 1 pound per day. He was away about three weeks at exhibitions, where he fretted very much, and there is no doubt that he could have gained the pound per day had he remained quiet in his paddock. At 10 months, he weighed 735 pounds, and at 22 months, 1,075 pounds. This latter weight is about the average for his sire and his dam, so that he will tip the scales, when mature, at from 150 to 200 pounds more than they. This colt was raised outside and has never been in the barn, except two weeks at exhibitions, having only a shed for shelter during the winter. This probably took more feed, but it kept the limbs in good shape, which would have been well nigh impossible, with the high feeding, had he been kept tied up, or even in a box stall.

Feed of two Weanlings.

So as to get more data on this question of the cost of raising horses, all the feed given to two weanlings was weighed. Both of these are males. One was dropped on June 11, and the other on July 31, 1914. On March 31, 1915, they had eaten the following quantities of feed:—

1,693 pounds hay at $7 per ton..	$ 5 92
1,115 " oats at 1½ cents per pound..	16 73
590 " bran at 1 cent per pound..	5 90
430 " whole milk at 1½ cents per pound..	6 45
3,024 " skim-milk at ⅕ cent per pound..	6 06
Total cost..	$41 06

These colts weighed respectively 115 and 110 pounds at birth; at 5 months, when they were weaned, the first weighed 600 pounds and the second 562 pounds; and on March 31, 1914, one was 290 days old and weighed 725 pounds, whilst the other was 240 days old and weighed 680 pounds. It is remarkable to note that, last year as well as this year, it cost about 18 cents per day to feed a colt from the time he was weaned, at 5 months, until March 31 following.

The feed of the yearling, and also that of at least one of the weanlings will be again all weighed until April 1, 1916.

CAP ROUGE.

EXPERIMENTAL HOUSING OF HORSES.

During the last three winters, five different colts have been kept outside, under single-boarded sheds, and the temperature went down as low as 31° F. below zero. Not one of these colts seemed to suffer from the cold, and they all seemed bright every day of the year. Colts will be wintered thus outside during the next few years, but this way of keeping them can be recommended even now, for our district. That it takes a little more food to keep up the necessary warmth cannot be denied, but against this, and more than balancing up the extra cost, is the good constitution of the horses, without which it is folly to expect success.

SELLING HIGH CLASS BREEDERS AT A REASONABLE COST.

The eleven mares and fillies at this Station are, it is admitted by all live stock men, the best stud of French Canadians in existence at any one place to-day. With them, half a dozen colts and fillies can be raised each year and sold as breeders at a reasonable cost. In choosing them, size and weight were taken into consideration, as long as the required type was there. The object is to raise horses weighing between 1,200 and 1,300 pounds, which will be hardy, of strong constitution, quick yet docile, good on the farm and on the road. It is not expected that they will replace the draughters for very heavy work, nor the roadsters for driving, but it seems that there must be a place for a general-purpose breed on the average small farm of the country, and this place cannot better be filled than by the French Canadian horse.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

HORSES.

This Station now owns eighteen horses, three of which are imported registered Clydesdale mares, three Canadian-bred registered Clydesdale mares, one registered Clydesdale foal dropped September 1, 1914, ten well graded Clydesdale work horses, and one driving horse.

Four of these mares were bred in the fall of 1914 with the object of raising fall colts, the fall being considered the most profitable time of the year for farmers, owing to the small amount of horse labour required through the fall and winter months compared with the labour through the spring and summer months, when the work of these brood mares is very essential. Unfortunately, none of these mares has proved in foal, but the same line of work will be undertaken this coming year.

The horses came through the winter in very good condition, with no sickness whatever, and have done the spring work with no sore shoulders or blemishes.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

HORSES.

The horses on this Farm consist of the following: Fourteen heavy farm horses, including two registered Clydesdale mares; two light horses for driving; one three-year-old colt.

No colts have been raised during the year, but some of the mares have been bred in the hope of raising colts next year.

CLASSIFICATION OF LABOUR.

The labour performed by the horses during the year has been divided as follows: Farm work (regular), 12,420 hours; Farm work (experimental), 10,040 hours; horticulture, 1,050 hours; roads, 580 hours; drawing feed, 1,370 hours; drawing manure, 1,840 hours; messenger service, 3,030 hours.

PURCHASE OF CLYDESDALE MARES.

In the fall of 1914 two registered Clydesdale mares were purchased. They were 3 and 4 years, and the older one is in foal. They are good representative specimens of the breed, and were raised by a Manitoba breeder.

WINTERING HORSES OUTDOORS.

Six of the horses were turned out-of-doors in the winter. They had a little open shed for their only shelter. They were fed as much good hay as they would clean up, and one gallon of oats each per day. They seemed to feel the cold somewhat for a few days when the first cold snap came, but after that they seemed to be perfectly contented all winter.

The total weight of the six horses when they were turned out was 8,730 pounds. When they were taken in this spring they weighed 9,035 pounds. This makes an average gain of a little over 100 pounds per horse. They came in in first-class condition for work. The horses that were turned out were the ones most inclined to have foot trouble or to stock up in the legs when standing in the stable during the winter. They were absolutely free from anything of this sort, and came in with their feet and legs in good condition.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MacBEAN, B.S.A.

HORSES.

At the Experimental Farm at Indian Head there are at present eighteen horses, consisting of six work mares, four brood mares, four geldings, two filly foals, and two old drivers. Previous to this year the horses were used solely for farm work, but now that the raising and handling of live stock is receiving increased attention at this Farm, horse-breeding has been added to the many important phases of the work with stock.

With "breed from the best" as the watchword, only four out of the ten mares have been selected for breeding purposes. Three are pure-bred Clydesdales, while the fourth is a grade of the same breed. Two have been on the Farm for some years, but the other two were purchased from Alex. Mutch, Esq., of Lumsden, Sask., only last April.

Out of four foals, two are being raised. Of those lost, one was a weakling, while the other died of navel ill. This disease seems to be a scourge in this part of the country. One of the mares bought last spring has proved a very profitable investment, as her filly foal is a splendid type of Clydesdale.

With this latter mare and her filly as examples of an ideal, this Farm hopes to further the interest of draught-horse breeding very materially in the future.

Besides that of horse-breeding, considerable experimental work is being carried on during the winter months. Last year a number of tests were set on foot with a view to comparing different methods of feeding and handling the draught-horse in winter, and these have been continued this year.

The following table indicates the method of feeding and handling:—

Group.	Ration.	Method of Handling.		
		Light work.	Let out each day.	Stabled and Exercised.
1	Oat straw, oat sheaves, oats and bran	{1	1	{1
2	Oat straw, mixed hay, oats and ground flaxseed	{2	2	{2
3	Oat straw, mixed hay, oats and bran	{3	3	{3
4	Oat straw, alfalfa hay, oats and bran	{4	4	{4

The horses bracketed under "light work" and those under "stabled and exercised" were handled together in respective two-horse teams. Both the former teams were at work every day this winter, while the latter were exercised also daily with the exception in both cases of only one or two stormy days. The remaining four horses were, weather permitting, turned into a field every afternoon, where they took exercise at will.

During the experiment, which lasted for four months, the rations were weighed periodically and the horses monthly.

In the feeding of the horse, not only the animal's weight but his individuality also was recognized. In the latter connection, especially, very pronounced peculiarities were observed.

The following outline gives the amounts that were fed, the basis being that an idle horse should just get about half the feed given when at regular work. It may also be observed that those working were fed very lightly, as their work was not heavy.

Group 1.—Straw, oat sheaves, oats, and bran.

Morning.—Oat sheaf.
Noon.—Oats, one-half gallon; bran, one-quarter gallon; oat straw, 3 to 5 pounds.
Evening.—Oat sheaf.

NOTE.—The horses fed this ration did not relish it at the outset, but results go to show that an idle horse can thrive well thereon, providing he is fed good substantial feed soon enough to put him in heart for the spring work. Such a feed as the foregoing without the addition of bran would, however, be undesirable.

Group 2.—Straw, mixed hay, oats, and ground flaxseed.

Morning.—Oats, half gallon; ground flaxseed, 1 handful; hay, 3 to 6 pounds.
Noon.—Oats, half gallon; ground flaxseed, 1 handful; oat straw, 3 to 5 pounds.
Evening.—Oats, half gallon; ground flaxseed, 1 handful; hay, 3 to 6 pounds.

NOTE.—This ration, owing to the presence of flaxseed, kept the horses up in good condition, but care has to be exercised at all times to feed only a small amount, owing to its laxative effect, while occasionally one meets with a horse that will scarcely eat it. Such was our experience with horse No. 2 of this group.

Group 3.—Straw, mixed hay, oats, and bran.

Morning.—Oats, half gallon; bran, quarter gallon; hay, 3 to 6 pounds.
Noon.—Oats, half gallon; bran, quarter gallon; oat straw, 3 to 5 pounds.
Evening.—Oats, half gallon; bran, quarter gallon; hay, 3 to 6 pounds.

NOTE.—Results herein go to prove that this ration is a very satisfactory one.

Group 4.—Straw, alfalfa hay, oats, and bran.

Morning.—Oats, half gallon; bran, quarter gallon; alfalfa hay, 2 to 5 pounds.
Noon.—Oats, half gallon; bran, quarter gallon; straw, 3 to 5 pounds.
Evening.—Oats, half gallon; bran, quarter gallon; alfalfa hay, 2 to 5 pounds.

NOTE.—Alfalfa was found to be a desirable constituent when fed under the conditions outlined, but a less amount should be fed than would be of mixed hay.

The most expensive ration was that in which flaxseed was fed, while that containing alfalfa hay followed next. The ration composed of mixed hay, oat straw, oats, and bran was the cheapest, due, no doubt, to the fact of there being less waste with it than with that in which oat sheaves were included. The latter came third in order of expensiveness.

The average cost per day per horse was, of course, low in each group, for the reason that the horses were fed as lightly as possible in consideration of the fact that the aim was economical feeding.

The average weight of the horses in these tests is 1,600 pounds, while, with the foregoing method of handling and feeding, they were carried through the winter in a very satisfactory manner.

This work will be carried on for some time yet, with a probable addition of other useful experiments.

INDIAN HEAD.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

HORSES.

On the Scott Experimental Station there are at present eleven work horses, four grade Clydesdale colts, and one driver. Two of the colts are 3 years old and have been broken in during the past month. Two of the work horses have been purchased this past winter.

HORSE FEEDING EXPERIMENTS.

The cost of wintering horses is an important item in the yearly expenditures of the farmers of Western Canada. Large numbers of horses are required during the summer months, while but few are needed for the winter work.

One phase of the experimental work with horses on this Station has consisted of an investigation into the cost of wintering idle farm horses. Five heavy draught horses were turned out to pasture on the prairie during the day and stabled at night. Two other horses were kept in the stable and given, on an average, about one hour's exercise each day, either in harness or in the paddock.

The roughage for all horses was oat straw. The horses that were feeding on the prairie only received straw at the evening meal. The horses that were in the stable received straw three times per day. Both lots received oat chop morning and evening. Water was given before feeding the grain. On two evenings each week, boiled oats were substituted for the regular ration. The horses were given salt twice a week.

The experiment in wintering horses was conducted for four months.

COST OF WINTERING IDLE WORK HORSES.

LOT 1.—ON PASTURE DURING THE DAY, STABLED AT NIGHT.

Number of horses in experiment		5
Weight at beginning of experiment, December 1	Lb.	7,925
Weight at termination of experiment, March 31	"	7,760
Total loss in weight in 121 days	"	165
COST OF FEED.		
Oat chop—5,257 pounds at 1½ cents per pound	$	78 85
Oat straw—4,000 pounds at $2 per ton	"	4 00
Total cost for 121 days	$	82 85
" per horse for 121 days	"	16 57
Cost per horse per day	Cts.	13.5

NOTE.—The horses in this test were heavy draught eastern horses. Previous to the winter of 1913-14 they were not accustomed to feeding on the prairies.

LOT 2.—KEPT IN THE STABLE.

Number of horses in experiment		2
Weight at beginning of experiment, December 1	Lb.	2,680
Weight at termination of experiment, March 31	"	2,680
COST OF FEED.		
Oat chop—1,677 pounds at 1½ cents per pound	$	25 15
Oat straw—6,000 pounds at $2 per ton	"	6 00
Total cost for 121 days	$	31 15
" per horse for 121 days	"	15 57
Cost of feed per horse per day	Cts.	12.8

INVESTIGATIONS AS TO THE COST OF RAISING HORSES.

In the investigation as to the cost of raising horses, two colts rising 3 years old, one colt rising 2 years old, and one weanling have been used. In securing the following data it has been considered advisable to commence keeping a record of the feeds consumed at the time when the foals are weaned. It will also be noted that the cost of feeds during the past season has been exceptionally high, and that the actual cost of raising each of the 3-year-old colts has only been $56.24. The sum total cost of feeding each yearling, 2-year-old, and 3-year-old colt for the past season has amounted to $71.96. fed liberally on the feeds given in the following table:—

COST OF FEEDING COLT RISING 1 YEAR OLD.

The colt in this experiment was weaned when 5 months old. From date of weaning, which was on November 15, till March 31, all the feed given this colt was carefully weighed. The following table gives the amounts, and the cost of the food consumed:—

Weight at beginning of experiment, November 15	Lb.	623
Weight at termination of experiment, March 31	"	725
Total gain in weight in 136 days	"	102
Gain in weight in 1 day	"	.75

COST OF FEED.

Oat chop—340 pounds at 1½ cents per pound	$	5 10
Bran—136 pounds at 1¾ cents per pound	"	2 38
Prairie hay—668 pounds at $10 per ton	"	3 34
Red clover—408 pounds at $10 per ton	"	2 04
Alfalfa—315 pounds at $12 per ton	"	1 57
Total cost for 136 days	$	14 43
Cost for 1 day	Cts.	10·6

NOTE.—The colt was turned out regularly in the paddock for a few hours every day, excepting a few stormy days when it was allowed the run of a box stall in the barn. While not overly fat, the colt continued healthy throughout the entire winter.

COST OF FEEDING COLT RISING 2 YEARS OLD.

This colt was stabled at night during the spring of 1914, and was allowed to run in the pasture during the day. During the summer it was in the pasture day and night, receiving no grain whatever. Early in November it was brought into the stable and fed liberally of the feeds given in the following table:—

Weight at beginning of experiment, April 1, 1914	Lb.	532
Weight at termination of experiment, March 31, 1915	"	1,000
Total gain in weight in 365 days	"	468
Gain in weight in 1 day	"	1.28

COST OF FEED.

Oat chop—736 pounds at 1½ cents per pound	$	11 04
Bran—153 pounds at 1¾ cents per pound	"	2 67
Prairie hay—1,183 pounds at $10 per ton	"	11 83
Alfalfa—385 pounds at $12 per ton	"	2 31
Pasture—6 months at $1 per month	"	6 00
Total cost for 365 days	$	33 85
Cost for 1 day	Cts.	9 33

NOTE.—For several hours each day, this colt was turned out in the paddocks for exercise.

SCOTT.

COST OF FEEDING COLTS RISING 3 YEARS OLD.

These colts ran in the pasture during the summer, and were brought into the stable at night after November 5. They ran out in the pasture during the day throughout the entire winter until March 1, when they were kept in and broken to the harness.

Number of colts in experiment..		2
Weight at beginning of experiment, April 1, 1914..	Lb.	1,835
Weight at termination of experiment, March 31, 1915..	"	2,310
Total gain in weight in 365 days..	"	475
" " per colt per day..	Cts.	.65

Cost of Feed.

Oat chop—1,778 pounds at 1½ cents per pound..	$	26 67
Hay—741 pounds at $10 per ton..	"	3 70
Straw—1,000 pounds at $2 per ton..	"	1 00
Pasture—8 months at $1 per head per month..	"	16 00
Total cost for 365 days (two colts)..	$	47 37
" 365 " (one colt)..	"	23 68
Cost per colt per day	Cts	6.08

SUMMARY OF COST OF RAISING COLTS UP TO 3 YEARS OF AGE.

From time of weaning until 1 year old..	$14 43
" 1 to 2 years old..	33 85
" 2 to 3 years old..	23 68
Total cost to 3 years old..	$71 96

Scott.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

HORSES.

The horses at the Lacombe Station number twenty-one head. There are in all thirteen mares, two pure-bred Percherons, four pure-bred Clydesdales, and seven grade Clydesdales. Only one of the draught mares produced a foal in 1914, and this was unfortunately lost (being killed probably by a timber wolf). Of the mares bred in 1914 two are in foal. All of the horses not in use during the winter ran out, and for the eight weeks prior to March 31 were fed green sheaves. The cost per head of wintering these mares during the early part of the winter, when only straw was fed, was $1 per month; when in addition to the straw, two bundles of green sheaves were fed each animal per day, the cost has been $2.50 per month. The animals so wintered have come through in fair condition as to flesh, and in perfect health.

The cost of carrying three yearling fillies from April 1, 1914, to March 31, 1915, is given in the following table:—

Cost of carrying Three Fillies, 1 year old in the Summer of 1914, from April 1, 1914, to March 31, 1915.

Gross weight, April 1, 1914	Lb.	2,160
8,150 pounds green feed at $10 per ton	$	40 75
2,400 pounds hay at $10 per ton	"	12 00
45 bushels oats at 1 cent per pound	"	15 30
200 pounds chop at 1 cent per pound	"	2 00
600 pounds bran at $1.60 per cwt	"	9 60
5 months pasture at $1 per month per head	"	15 00
Combined weight, March 31, 1915	Lb.	3,520
Total gain	"	1,360
Average gain	"	453
Average gain per day	"	1·24
Cost of 1 pound gain on 1-year-old fillies	Cents.	6·95

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

Since the force of horses has been kept for working purposes only, no experiments have been made with them. Careful figures have been kept as to the cost of maintaining a work horse, and these are given below.

The food for the year for the whole force of horses averaged 16 pounds of clover hay per head per day, and 11·41 pounds of grain. The grain was made up of four-fifths home-grown peas, oats, and barley, and one-fifth wheat bran. During the winter each horse ate 4 pounds of either carrots or mangels each day. The horses were never very fat, but they were always in first-class working condition. The average cost for all the horses was as follows:—

Grain, 4,164·65 pounds at 1·3 cent	$ 54 14
Clover hay, 5,840 pounds at ·5 cents	29 20
Roots, 800 pounds at 2 cents	1 60
Total	$ 84 94

The heaviest horses (over 1,800 pounds) consumed food in the year as follows:—

Grain, 4,562·5 pounds at 1·3 cent	$ 59 31
Clover hay, 6,570 pounds at ·5 cent	32 85
Roots, 800 pounds at ·2 cent	1 60
Total	$ 93 76

The lightest horses (under 1,500 pounds) worked less and cost less, as follows:—

Grain, 3,766 pounds at 1·3 cent	$ 48 95
Clover hay, 5,110 pounds at ·5 cent	25 55
Roots, 800 pounds at ·2 cents	1 60
Total	$ 76 10

A driving pony, which was very fat and which was never overworked, did not cost very much to keep in food. She is, however, very hardy and an exceptionally easy keeper. Her account is as follows:—

Grain, 1,460 pounds at 1·3 cent	$ 18 98
Clover hay, 2,920 pounds at ·5 cent	14 60
Roots, 800 pounds at ·2 cent	1 60
Total	$ 35 18

For a few nights only, at midsummer, the horses were allowed out to pasture. This small amount of food is not charged against them. On a farm such as this, where pasture is extremely scarce, we do not consider it good policy to let the horses out. If we had a good paddock of permanent grass, however, some benefit might be gained by cheapness of feeding. As the nights are always cool, the horses would rest well and do better in the stable.

The horses were kept at work through the whole year; in summer at the regular field work, in winter at roadmaking, winter ploughing and cultivation, land-clearing, and breaking. Two of the old horses, which were worn out, were destroyed and three colts were bought at the close of the year. This gives us a total force of two pure-bred Clyde mares 4 years old, three mature heavy-draught grade Clydes, two mature light-draught grades (old), three heavy-draught colts 3 years old, one general purpose mare, and one light driving mare; a total of twelve horses.

SHEEP.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN, E. S. ARCHIBALD, B.A., B.S.A.

BREEDING SHEEP.

There are now ninety-eight pure-bred sheep in the flocks. Two breeds only are kept, namely, Shropshires and Leicesters.

The Shrophires include seventy-one head, made up of three rams, twenty-four aged ewes, thirteen shearling ewes, nineteen spring ewe lambs, and twelve spring ram lambs.

The Leicesters include twenty-seven head, made up of three rams, seventeen aged ewes, and seven shearling ewes.

Again only a fairly successful year can be reported in the breeding operations with sheep. The lamb crop in the spring of 1914 was very good, namely, 129 per cent reared. During the past fiscal year both ewes and lambs did particularly well until midsummer. Limited as they were to the 2 acres of pasture contained in the 6-acre sheep rotation, the pasture lasted but a short time. The experiment of keeping the sheep on the Farm roadsides, to ascertain their influence on keeping the roadsides clean, as well as to ascertain the cost of attention for this method of pasturing, was continued. Although it has proven somewhat more expensive than ordinary methods of pasturing, yet the added weight of the lambs and the improved condition of the ewes would appear to warrant this method if the flock were two or three times its present size.

I am pleased to report that during the past year the ewes and lambs were attacked only to a very slight extent with tape worms and stomach worms. Only a few of the late lambs showed any effects from the presence of these parasites, and these were successfully treated and have made a fair recovery. The treatment reported in the last annual report was the one most successful in eliminating these parasites.

SHEEP FEEDING EXPERIMENT NO. 1.

ELEVATOR SCREENINGS FOR THE FATTENING OF LAMBS.

In the fall of 1914, eighty ewe and wether lambs of grade breeding and uniform size were purchased for delivery at the Central Experimental Farm during the first two weeks of October. These lambs were dipped a few days after their arrival and, together with the pure-bred ewe lambs of the Farm flock, were divided into six lots for experimental feeding.

Analysis of Elevator Screenings.

The following botanical analyses were supplied by the seed commissioner.

A composite sample of 6,000 tons of elevator screenings gave the following separations: 37 per cent scalpings, 7 per cent succotash flax, 18 per cent buckwheat screenings, 38 per cent black seeds.

Scalpings.—65 per cent wheat; 25 per cent other grains, 3 per cent weed seeds; 7 per cent straw and chaff. Considered excellent feed—no immediate need to investigate its value.

Succotash flax.—30 per cent flax; 40 per cent broken wheat; 15 per cent weed seeds, chiefly wild buckwheat, lamb's quarters, and wild oats; 15 per cent chaff.

Buckwheat screenings.—58 per cent wild buckwheat; 29 per cent broken wheat, oats, and flax; 9 per cent weed seeds; 4 per cent chaff.

Black seeds.—Before analysing this material a separation was made of it by means of the 1/25-inch perforated zinc sieve.

The 38 per cent black seeds was thus separated into 7 per cent which passed through the 1/25-inch sieve and 31 per cent above it.

Of the portion passing through the 1/25-inch sieve, 22 per cent was tumbling mustard, 63 per cent dust, 10 per cent lamb's quarters, and 5 per cent other weed seeds.

Of the portion passing over the 1/25-inch screen, 53 per cent was lamb's quarters, 3 per cent wild mustard, 8 per cent other mustard, 9 per cent other weed seeds, and 27 per cent chaff.

Object of Experiment.

1. To illustrate the value of a well-balanced grain ration in lamb fattening work.
2. To compare this with elevator screenings.
3. To determine the value of elevator screenings alone.
4. To determine the value of elevator screenings less black seeds.
5. To illustrate the feasibility of feeding black seeds alone where possible.
6. To increase the palatability of black seeds by an addition of Caldwell's molasses meal.

Weights.

During the experiment each lamb was weighed individually. The original weights taken on the day the lambs arrived were considered as the buying weights. After the preparatory feeding period the lambs were weighed into the experiment, and further individual weights taken at two-week intervals from the start until the completion of the experiment.

Feeding (preparatory period).

During the first two weeks all of the lambs were fed the same ration, which in this case consisted of a certain amount of pasture; and when fed in-doors, the same quantity of hay as they later received during the experiment, together with ⅛ pound each of the grain ration which was used in lot 1 during the experiment, that is: Oats, 2 parts; bran, 2 parts; oil cake, 1 part.

Roughages.

All lambs were fed the same quality and quantity of roughage. The hay consisted of mixed clover and timothy, and, for part of the experiment, of alfalfa hay fed at the rate of 1½ pound per lamb per day. The succulent roughage throughout the period consisted of corn ensilage and pulped turnips, equal parts, mixed, fed at the rate of from 4 to 7 pounds per lamb per day.

Grains.

The following indicates the method of division of the lambs for the experimental feeding period:—

Lot 1 received a grain mixture composed of: Oats, two parts; bran, 2 parts; oil cake, 1 part.

Lot 2 received one part of the above mentioned mixture mixed with one part of complete elevator screenings.

Lot 3 received complete ground elevator screenings.

Lot 4 received complete ground elevator screenings less the black seeds usually contained therein.

Lot 5 received ground black seed.

Lot 6 received ground black seed, two parts; Caldwell's molasses meal, two parts.

Plan of Feeding.

The grain mixture for each lot was fed first and followed by the roughage. Each lot received its special grain mixture throughout the whole period. It was planned to feed meals in the quantity given below. However, with certain of the rations which proved unpalatable this schedule could not be followed. The actual quantities eaten will be found in the experimental tables, the portion removed daily from each pen being credited to that particular lot.

First week, 8 ounces per lamb per day.
Second " 10 " "
Third " 12 " "
Fourth " 14 " "
Fifth " 16 " "
Sixth " 18 " "
Seventh " 18 " "
Eighth week, until the completion of the experiment, 20 ounces per lamb per day.

Values of Feeds.

Standard meal mixture—1·4 cent per pound.
Complete pulverized screenings—$10 per ton.
Screenings, less black seeds—$12 per ton.
Black seed—$4 per ton.
Caldwell's molasses meal—$34.50 per ton.
Hay—$7 per ton.
Roots and ensilage—$2 per ton.

SHEEP FEEDING EXPERIMENT No. 1.—Elevator Screenings for the Fattening of Lambs.

Lot.		1.	2.	3.	4.	5.	6.
Feed given.		Meal.	Meal and screenings.	Screenings.	Screenings less black seeds.	Black seeds.	Black seeds and molasses meal.
Number of animals in each group		21	20	20	20	20	20
First weight, gross	lb.	1,602	1,677	1,485·5	1,468·5	1,741·5	1,492
First weight, average	"	76·3	83·9	74·3	73·4	87	74·9
Finished weight, gross	"	2,014	2,120	1,770	1,879	2,083	1,747
Finished weight, average	"	95·9	106	88·5	93·9	104·1	87·3
Number of days in experiment	days	70	70	70	70	70	70
Total gain for period	lb.	412	443	284·5	410·5	341·5	255
Average gain per animal	"	19·6	22·1	14·2	20·5	17·1	12·7
Average daily gain for group	"	5·8	6·3	4·0	5·8	4·8	3·6
Average daily gain per animal	"	0·28	0·31	0·2	0·29	0·24	0·18
Quantity meal eaten by group for period	"	1,442	1,383	892	1,298	650	1,383
Quantity hay eaten by group for period	"	2,205	2,100	2,100	2,100	2,100	2,100
Quantity roots and ensilage eaten by group for period	"	8,416	7,980	7,140	5,900	7,690	7,030
Total cost of feed	$	36·31	27·46	19·95	22·27	16·34	27·51
Cost of feed per head	$	1·72	1·37	0·99	1·11	0·82	1·38
Cost of feed per head per day	$	0·024	0·019	0·014	0·016	0·012	0·019
Cost to produce 1 pound gain	$	0·088	0·062	0·07	0·054	0·048	0·108
Original cost of animals at $7.40 per cwt	$	118·54	124·09	109·92	108·66	128·87	110·40
Original cost plus cost of feed	$	154·85	151·55	129·87	130·93	145·21	137·91
Selling price at $8.25 per cwt	$	166·15	174·90	146·02	155·01	171·84	144·12
Net profit per group	$	11·30	23·35	16·15	24·08	26·65	6·21
Net profit per animal	$	0·54	1·16	0·80	1·20	1·33	0·31

OTTAWA.

The most striking fact revealed by a study of the foregoing table is the relatively low cost of feed, with the consequent low cost per pound gain, when the standard meal ration is compared with those containing various grades and percentages of elevator screenings. In this connection it might be mentioned that the lot receiving the standard ration were pure-bred lambs and were not nearly as uniform as were the remaining lots; that is, some were late lambs, others, through untoward circumstances, not so well developed as they should have been. Lots 2, 3, 4, 5, and 6, however, were uniformly high grade and, in the initial separation into groups, the idea of group uniformity was still further accentuated. The pure-bred lambs had been accustomed to a well-balanced ration with limited range, and were in good flesh; the grades, while in excellent condition, were spare and just off the pastures, where in all probability they received little grain. In short, the grade lambs were in better condition to show rapid gains than were the pure-breds.

Palatability of Rations.

As to the palatability, or, from the lamb's point of view, the desirability, of the grain ration, lot 1, of course, consumed their meal in whatever quantity fed, from the start.

With the exception of a few pounds removed during the first few days, the same might be said of lot 2, receiving equal portions of the standard ration and pulverized screenings.

With lot 3, during the first twelve days, practically the entire ration was removed daily, and from then on in lesser quantities, until at the end of four weeks, it was being consumed cleanly. That this was done more or less under protest, however, was shown by the lambs, after eating the ration for about a week, refusing from one-third to one-sixth of it daily throughout the remainder of the experiment.

Lot 4, fed pulverized screenings with black seeds removed, after the first two weeks consumed their meal cleanly throughout the experiment, apparently with relish.

Lot 5, on pulverized black seed, refused their ration almost entirely for five weeks, and at the conclusion of the experiment were consuming about half the quantity fed, which portion disappeared only after very apparent effort and dislike.

Lot 6, on equal portions of pulverized black seed and molasses meal, consumed their ration cleanly from the start, showing a strong liking for it, the molasses meal apparently quite effectually neutralizing the undesirable flavour and nature of the undiluted black seed.

Texture of Pulverized Screenings.

The nature of the by-product, aside from flavour, in all its grades, was such as to render it unpalatable to sheep, the screenings being so finely pulverized as to be of a dust-like consistency. This fine pulverization was necessary to guard against possible spread of noxious weed seeds.

Health of Lambs.

No toxic effect was noticed from the use of the by-product in any of its grades; in fact, the health of the lambs was excellent throughout, barring, of course, a few isolated cases of scours, not necessarily due to the nature of the ration, and easily controlled by simple remedies.

Comparing the results from the standpoint of total gains, the following is the result:—

First Lot 2.—(Screenings, standard meal, equal parts.)

Second Lot 1.—(Standard meal.)

Third Lot 4.—(Screenings with black seeds removed.)

Fourth Lot 5.—(Black seed.)

Fifth Lot 3.—(Pulverized screenings complete.)

Sixth Lot 6.—(Black seed, molasses meal, equal parts.)

Comparing from the standpoint of cost to produce 1 pound gain, the following is shown:—

First Lot 5.—(Black seeds.)

Second Lot 4.—(Screenings, black seeds removed.)

Third Lot 2.—(Standard ration, screenings, equal parts.)

Fourth Lot 3.—(Complete pulverized screenings.)

Fifth Lot 6.—(Black seed, molasses meal, equal parts.)

Sixth Lot 1.—(Standard meal.)

Referring to the first comparison, the results are what might have been anticipated. Lot 2 were rangier and better feeding lambs than Lot 1, and although they received a ration less nutritious and palatable, were in a position to make more telling use of their food. Lot 2 on the standard well-balanced ration, although lacking in uniformity and general condition, should have been in either first, or at least second, place. Lot 2 in third place had consumed what should have been the most desirable screenings ration. Lot 5, however, consumed the least desirable ration of all, yet were able to make better gains than lots 3 and 6 on complete screenings and black seed plus Caldwell's molasses meal, equal parts, the latter two coming in the order given, fifth and sixth respectively. Why this should be the case is difficult to explain, considering the comparatively small portion of the black seed ration eaten. While the supposition may, perhaps, scarcely be warranted, it would appear that this refusal to partake of the black seed was, in reality, their salvation, knowing that lot 3 on a ration containing a proportion of black seeds, and lot 6 on black seeds and molasses meal both stood lower; in other words, that better gains would have been made by eliminating black seeds entirely, and that while its presence might be counteracted from the standpoint of palatability, its undersirable propensities still remained active. It should be noted, too, that lot 5 (black seeds) consumed considerably more ensilage and roots than did either lots 3 or 4.

From the cost-to-produce standpoint of comparison, the rather remarkable results may at least in part be explained by the comparatively low valuation placed on the elevator by-products. This fact may partially explain the high standing of black seeds and the poor showing of the well-balanced ration. Black seeds with molasses meal, which it will be remembered was a palatable mixture, is the only ration having the unenviable consistency of occupying the same position in both comparisons.

Another important point in sheep feeding work was disclosed, namely: The value of a well-balanced, palatable roughage ration, especially in the earlier months of a feeding period. In this experiment, when in the case of the lambs receiving a by-product ration, particularly lots 3 and 5, the meal proved more or less unpalatable, the greatest gains were made after the fourteenth and up to the fiftieth day. After the fiftieth day gains were small, particularly in the case of the lambs receiving a ration containing blackseeds, lot 3 being practically at a standstill, and lots 5 and 6 actually losing in weight. This would indicate that from the fourteenth day, or when the lambs were

consuming a fair ration of ensilage, roots, and hay, and up to the fiftieth day, approximately, the excellent roughage ration they received enabled them to produce economically with very little meal, and that of an unpalatable nature.

Further interesting comparative facts and figures are hereby deduced, and while they are correct as far as the actual data are concerned, the effect of the factors already discussed must not be forgotten.

1. Comparing standard meal (lot 1) with lot 2, it is seen that with the valuation of other feeds in this mixture, 691 pounds of complete elevator screenings has a value equal to 851 pounds meal, 259 pounds hay, and 1,025 pounds roots, or $39 per ton.

2. Comparing lot 1 and lot 3 it is seen that 1,442 pounds standard meal equals 1,248 pounds screenings, 735 pounds hay, and 1,500 pounds roots, at above valuation of $26 per ton.

3. Comparing lot 1 and lot 4 it is seen that 1,298 pounds screenings with black seeds removed is equivalent to 1,442 pounds meal, 105 pounds hay, and 2,516 pounds roots, or $36 per ton.

Note.—From these deductions where complete screenings are shown to be worth $26 and screenings with black seeds removed worth $36, the value of the removal of black seeds is apparent.

4. Comparing lots 3 and 4 it is seen that 1,298 pounds screenings with black seeds removed is equivalent to 1,248 pounds screenings, 750 pounds hay, and 4,096 pounds roots. The advisability of the removal of black seeds from the total screenings is again evident.

Similar deductions with periods V and VI are practically impossible. As has been pointed out, the effect of black seeds, whether fed pure or mixed with other meals, is detrimental, and that, with lot 5, the small quantity eaten was actually a detriment, the gains being due to the ensilage, roots, and roughage ration. Similarly with lot 6 the gains may be attributed to the roughage and molasses meal. In both instances the elimination of black seeds from the ration would have, in all likelihood, resulted in increased gains.

The results once more point to the advisability of the separation of black seeds from the screenings, and to the undoubted value of the screenings with black seeds removed, for sheep-feeding work.

Ottawa.

Finishing Period.

At the close of the regular experiment, or to be exact, one week after that time, a second feeding or finishing period was begun in which all the lots received the same meal mixture: Oats, two parts; bran, two parts; oil cake, one part.

SHEEP FEEDING EXPERIMENT NO. II.—Finishing Lambs for Market.

Lot.		1.	2.	3.	4.	5.	6.
Feed given.		All lots received regular meal ration.					
Number of animals in each group		21	20	20	20	20	20
First weight, gross	lb.	2,032	2,160	1,740	1,860	2,062	1,725
First weight, average	"	97	108	87	93	103	86
Finished weight, gross	"	2,369	2,370	2,108	2,190	2,536	2,124
Finished weight, average	"	113	118	105	109	127	106
Number of days in experiment	days.	55	55	55	55	55	55
Total gain for period	lb.	337	210	368	330	474	399
Average gain per animal	"	16	10·5	18	16·5	23·5	19·9
Average daily gain for group	"	6	3·8	6·7	6·6	8·6	7·2
Average daily gain per animal	"	0·28	0·19	0·33	0·33	0·43	0·36
Quantity meal eaten by group for period	"	1,444	1,305	1,305	1,305	1,305	1,305
Quantity hay eaten by group for period	"	1,733	1,650	1,650	1,650	1,650	1,650
Quantity roots and ensilage eaten by group for period	"	5,500	4,400	4,400	4,400	4,400	4,400
Total cost of feed	$	31·77	28·44	28·44	28·44	28·44	28·44
Cost of feed per head	$	1·51	1·42	1·42	1·42	1·42	1·42
Cost of feed per head per day	$	0·027	0·026	0·026	0·026	0·026	0·026
Cost to produce 1 pound gain	$	·094	0·135	0·077	0·086	0·06	0·071
Original cost of animals at $7.75 per cwt	$	157·48	167·40	134·85	144·15	159·80	133·68
Original cost plus cost of feed	$	189·25	195·84	163·29	172·59	188·24	162·12
Selling price at $8.50 per cwt	$	201·36	201·45	179·18	186·15	215·56	180·54
Net profit per group	$	12·11	5·61	15·89	13·56	27·32	18·42
Net profit per animal	$	0·57	0·28	0·79	0·67	1·36	0·92

In reviewing the results obtained through the medium of the foregoing table, the observations made in the preceding paragraph should be remembered. Comparing results from standpoint of total gains:—

First Lot 5.—(Black seeds.)

Second Lot 6.—(Black seeds, molasses meal, equal parts.)

Third Lot 3.—(Complete screenings.)

Fourth Lot 1.—(Standard ration.)

Fifth Lot 4.—(Screenings, less black seeds.)

Sixth Lot 2.—(Screenings, regular meal, equal parts.)

Lots 5, 6, and 3, receiving black seeds in various percentages, were all losing weight at the end of the regular experiment, having apparently reached their limit of production on a roughage diet supplemented by inferior meal. The pure-bred lambs of lot 1 having grown and improved in condition generally, during the regular experiment, were also in a position to make fair gains, while the grade lambs in lots 4 and 2 which had received the most desirable screenings rations previously, stand fifth and sixth respectively.

OTTAWA.

This period, therefore, while primarily intended to give a uniform finish to the lambs, further bears witness to the fact that the black seed-fed lambs were held back during the experiment, as evidenced by their very rapid comparative gains during the finishing period. In spite of the fact that many of the grade lambs were fed meal rations known to be unpalatable, and probably actually harmful, it is interesting to note that in April, at the conclusion of the finishing period, they sold for top price on the Toronto market.

FINANCIAL STATEMENT FOR SHEEP.

Below are submitted inventories and returns for sheep on the Central Experimental Farm during the year April 1, 1914, to March 31, 1915.

—	April 1, 1914.		March 31, 1915.		Returns including sales.	Gross returns made up of increased value and sales and manure.
	No.	Value.	No.	Value.		
		$		$	$	$
Sheep, all breeds and ages......	81	1,866 00	98	2,517 00	1,371 43	2,022 43

Returns.

By increase in value of flocks..................................	$ 651 00	
Sales of breeding stock..................................	146 00	
Sales of feeding lambs..................................	1,033 33	
Sale of wool, 345 pounds at 18 cents..................................	62 10	
Manure, 130 tons at $1..................................	130 00	
Gross returns..................................		$ 2,022 43

Expenditures.

To Food consumed..................................	$ 705 00	
Feeding lambs purchased..................................	528 22	
Labour expended..................................	700 00	
Gross expenditures..................................		$ 1,933 22
Net balance from sheep..................................		$ 89 21

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

BREEDING SHEEP.

The nine Leicester breeding ewes gave ten strong lambs in the spring of 1914. During the summer the flock, which had very limited pasture, did not do well, and in the autumn they were found to be very badly infested with internal parasites. They were freed from tape worms by a number of treatments with 1-dram doses of the oil of male shield fern in from 2 to 3 ounces of castor oil for each mature sheep, given after a twenty-four hour fast. The infestation of stomach worms has been much harder to deal with, as the area of sheep pasture at this Station is at present limited to one small field, and treatment has to extend over a long period of time as the larval stage in the sheep's body is practically immune to treatment with medicine. During the winter months the mortality from these parasites was high, and no effective treatment has yet been found except frequent changes of pasturage during the summer months, the sheep not being allowed again the same season on any of the fields they had previously fed over.

EXPERIMENT IN FATTENING LAMBS.

The experiment in fattening lambs was continued with five pens of eleven lambs each. The fifty-five lambs in the experiment cost, on an average, including feed previous to the commencement of the test, 5½ cents per pound, live weight. Prime lambs at the time sold as high as 6⅞ cents per pound live weight. Only light-weights were used this season, the average of all the lambs being 64½ pounds. The lambs were allowed to run on clover pasture for a few days after coming off the cars, before the experiment was started. From November 17, when the experiment was commenced, the lambs were fed as follows: Each lot received 2⅓ pounds of grain and 15 ounces of bran per day at the start, except pen V, which received the above quantity of bran and an equal amount of oil cake, the oil cake replacing a part of the grain mixture. The grain fed the lambs was fed whole and contained about nine parts of oats to one part of barley. The grain was increased by one-tenth pound per lot per day throughout the experiment. The bran was increased as needed up to 2½ pounds per pen per day. The oil cake fed to lot 5 was increased up to 2 pounds per day to the pen. The pens were made up as uniform in quantity as possible. The lambs were sold at auction, and the prices paid would indicate the buyer's judgment of the quality of the pens at the close of the experiment. The roughage fed the different lots was as follows:—

- Lot 1 was fed clover hay.
- Lot 2 was fed mixed clover and timothy hay and corn stover in the proportion of two parts hay to one part stover until February 8, when the stover was stopped.
- Lot 3 was fed timothy hay and mangels.
- Lot 4 was fed clover hay and roots.
- Lot 5 was fed clover hay with the addition of oil cake mentioned above.

The lambs were dipped with Cooper's dip on November 25.

In calculating the cost of feeding, the following prices were charged: Roots and corn stover, $2 per ton; hay, $7 per ton; meal mixture and bran, $26 per ton, oil cake, $44.50 per ton.

TABLE I.—LAMB FATTENING EXPERIMENT.—Clover hay *versus* mixed hay, and corn stover *versus* timothy hay, and roots *versus* clover hay and oil cake.

Lot.		1.	2.	3.	4.	5.
Class of feed for lot.		Clover hay.	Mixed hay, corn stover.	Timothy hay, mangels.	Clover hay, roots.	Clover hay, oil cake.
Number of lambs in lot		11	11	11	11	11
Number of days in experiment		135	135	135	135	135
Total weight at beginning	lb.	695	691	695	694	695
Total weight at end	"	822	798	820	890	917
Gain during period	"	127	107	125	196	222
Gain per head	"	11·5	9·7	11·3	17·8	20·1
Gain per head per day	"	0·085	0·071	0·084	0·132	0·149
Quantity of meal eaten by lot	"	1,182	1,129	1,122	1,182	1,016
Quantity of oil cake eaten by lot	"	....	....	....	....	235
Quantity of clover hay eaten	"	2,182	....	....	2,228	2,255
Quantity of mixed hay eaten	"	....	1,778	....	....	....
Quantity of timothy hay eaten	"	....	....	2,034	....	....
Quantity of roots eaten	"	....	....	1,063	1,070	....
Quantity of corn stover eaten	"	....	631	....	....	....
Total cost of feed	$	23·00	21·53	22·76	24·23	26·39
Original cost of lambs, at $5.50 per 100 pounds live weight	$	38·22	38·00	38·22	38·17	38·22
Original cost of lambs plus cost of feed	$	61·22	59·53	60·98	62·40	64·61
Selling price, at 6⅛ cents per pound	$	50·35	....	50·22	....	....
Selling price, at 6⅜ cents per pound	$	....	50·87	....	....	....
Selling price, at 7⅛ cents per pound	$	....	....	....	63·41	....
Selling price, at 8 cents per pound	$	....	....	....	....	73·36
Net profit or loss on lot	$	[1]10·87	[1]8·66	[1]10·76	1·01	8·75
Net profit or loss on lamb	$	[1]0·99	[1]0·79	[1]0·98	0·09	0·79
Cost to produce 1 pound gain	$	0·18	0·20	0·18	0·12	11·9

[1]Loss.

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TABLE II.—LAMB FATTENING EXPERIMENT.—Average results of three years' test of clover hay *versus* mixed hay, and corn stover *versus* timothy hay and roots as roughage in fattening lambs.

Lot.		1.	2.	3.
Class of feed for lot.		Clover hay.	Mixed hay, corn stover.	Timothy hay, mangels.
Number of lambs in lot		42	42	42
Number of days in experiment		103	103	103
Total weight at beginning	lb.	3,224¼	3,210¼	3,157
Total weight at end	"	3,694⅓	3,472¼	3,475¾
Gain during period	"	470	262	318
Gain per head	"	11	6	7½
Gain per head per day	"	0·107	0·058	0·063
Quantity of meal eaten by lot	"	3,308	3,132⅓	3,013⅓
Quantity of clover hay eaten by lot	"	8,899	....	....
Quantity of mixed hay eaten by lot	"	....	5,919	....
Quantity of timothy hay eaten by lot	"	....	....	6,228
Quantity of roots and ensilage eaten	"	....	4,889	5,217
Total cost of feed	$	73·07	64·87	65·23
Cost of feed per head	$	1·74	1·54½	1·55
Cost of feed per head per day	$	0·0169	0·015	0·0155
Original cost of lambs	$	163·30	162·67	160·29
Original cost of lambs plus cost of feed	"	236·37	227·54	225·52
Selling price	$	238·10	226·16	215·61
Net profit or loss on lot	$	1·73	[1]1·38	[1]9·91
Net profit or loss per lamb	$	0·04	[1]0·03	[1]0·23
Cost to produce 1 pound gain	cts.	15·5	24·7	20·4

[1]Loss

CHARLOTTETOWN.

LAMB FEEDING EXPERIMENTS.—Table of Weights and Gains.

Tag Number.	First Weight.	Last Weight.	Total Gain.
	Lb.	Lb.	Lb.
Pen No. 1—Tag No. 1	66	63	*3
" " 2	55	61	6
" " 3	70	78	8
" " 7	68	78	10
" " 11	62	70	8
" " 17	76½	95	18½
" " 20	69	99	30
" " 22	58	72	14
" " 70	57½	71	13½
" " 73	65	81	16
" " 74	48	54	6
Total	695	822	127
Pen No. 2—Tag No. 24	60½	71	10½
" " 26	63	73	10
" " 27	65½	48	*17½
" " 33	71½	73	1½
" " 36	69	77	8
" " 37	53½	66	12½
" " 38	55½	63	7½
" " 39	67½	88	20½
" " 62	71	100	29
" " 92	53	60	7
" " 96	61	79	18
Total	691	798	107
Pen No. 3—Tag No. 4	55½	79	23½
" " 18	78	99	21
" " 21	51½	60	8½
" " 65	65	75	10
" " 66	57	63	6
" " 67	54	75	21
" " 68	55½	58	2½
" " 71	74	102	28
" " 72	70½	96	25½
" " 75	63	59	*4
" " 76	71	54	*17
Total	695	820	125
Pen No. 4—Tag No. 69	62½	76	13½
" " 77	67½	99	31½
" " 78	68	70	2
" " 79	54½	75	20½
" " 81	80	105	25
" " 83	60	88	28
" " 84	65	98	33
" " 85	53	64	11
" " 87	62½	71	8½
" " 97	58	69	11
" " 86	63	79	16
Total	694	894	200
Pen No. 5—Tag No. 28	76	99	23
" " 34	83	105	22
" " 82	66	83	17
" " 89	54	67	13
" " 90	61	74	13
" " 93	56½	49	*7½
" " 94	57½	81	23½
" " 95	67	100	33
" " 98	63	89	26
" " 99	53½	91	37½
" " 100	57	84	27
Total	694½	922	227½

*Loss

CHARLOTTETOWN.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

SHEEP.

BREEDING FLOCK.

There are now eleven pure-bred Shropshire sheep at this Farm, made up of one 4-shear, one 3-shear, six 2-shear, two shearlings, one shearling ram, and one aged ram "Kelsey's Promise." The latter heads the flock.

A very successful year can be reported from the breeding work. All ewes except the two lambs were bred last fall. All lambs were dropped between the 20th and 30th of March. Nine ewes yielded eleven lambs. Two were rather weaker than the rest and did not survive. Hence there remains a total of nine lusty lambs from eight ewes, which is a very satisfactory increase. There are six ewes and three rams. One young ram from last year's crop was sold during the early winter.

Careful records are being kept of all feeds, etc., in order to demonstrate the profit to be derived from a flock of good sheep, when kept on the farm.

The following is the method of feeding, and foodstuffs consumed during the year: From April 1, 1914, to May 23, 1914, they received 1½ pound hay and one-quarter pound meal per head per day. From May 23 to November 1 (171 days) they were out on pasture. From November 1, 1914, to February 6, 1915, they received 1½ pound hay, 8 pounds roots, and 1½ pound meal per head per day. From February 13 to February 27 they received 1½ pound hay, 4 pounds roots, and 1½ pound meal per head per day. From February 27 to March 31 they received 1½ pound hay and 1½ pound meal per head per day.

The following table gives the total amount of each and cost of feed. The value of foodstuffs was: Hay, $8 per ton; meal, $1.59 per hundredweight; and roots and ensilage, $2 per ton.

No. of Sheep.	Period.	Hay.	Roots and Ensilage.	Meal.	Pasture.	Cost of Feed.
		Lb.	Lb.	Lb.	Days.	$ cts.
10	April 1, 1914, to May 23, 1914	795		132·5		5 28
10	May 23, 1914, to Nov. 1, 1914				1,610	13 10
12	Nov. 1, 1914, to Feb. 6, 1915	1,764	9,408	1,176		35 11
12	Feb. 6, 1915, to Feb. 13, 1915	126	672	126		3 17
12	Feb. 13, 1915, to Feb. 27, 1915	252	672	252		5 69
12	Feb. 27, 1915, to March 31, 1915	576		576		11 46
	Total 12 sheep 365 days	3,513	10,752	2,262·5	1,610	73 81

FINANCIAL STATEMENT.

Breed.	April, 1914.		April, 1915.		Returns including Sales.	Gross returns, made up of increase in value and Sales.
	No.	Value.	No.	Value.		
		$ cts.		$ cts.	$ cts.	$ cts
Shropshires, all ages	12	278 00	21	415 00	39 70	176 70

Returns.

By increase in value of flock	$ 137 00	
By sales of breeding stock	10 00	
By sales of wool	21 60	
Manure, 8·10 tons at $1 per ton	8 10	
		$ 176 70

Expenditure and Losses.

To food consumed	$ 73 89	
To labour	65 28	
To breeding stock	25 00	
		164 17
Net balance from sheep		$ 12 53

LAMB-FEEDING EXPERIMENT.

As there was practically no clover hay produced at this Farm during the season of 1914, it was thought impracticable to duplicate the previous year's experiment in testing the value of clover *versus* timothy hay for fattening lambs. However, it was considered most prudent to continue the feeding of lambs, in order to get more data regarding the value of various foods. With this object in view a similar feeding experiment was carried on by replacing the clover hay with a combination of timothy and broadleaf.

Fifty nice grade wethers were purchased at Antigonish in November, 1914, costing 6 cents a pound, f.o.b. Antigonish. The freight charge on fifty lambs was $21.25, making the total cost 6·5 cents a pound live weight. That is possibly the highest price lambs have reached during a like period for many years, but there was a great demand for good stock just at that season of the year in 1914.

The wethers were divided into four lots for this test. All lots were fairly even in weight and very uniform. Lot 1 received timothy hay and meal; lot 2, timothy hay, roots, and meal; lot 3 received one feed of timothy and one of broadleaf and meal; and lot 4, one feed of timothy hay and one of broadleaf, roots, and meal.

The meal was fed alike to all lots throughout the test and they received at the start one-half pound per head per day. This was gradually increased until at the end of the period they were receiving 1¾ pound. Each lamb in lots 2 and 4 received 8 pounds of pulped roots per day. This was decreased gradually until the end of the test, at which time they were receiving only 4 pounds. Lots 1 and 3 did not receive any roots. Lots 1 and 2 received 1½ pound of timothy hay per lamb per day. Lots 3 and 4 received timothy hay at the rate of 1 pound, and broadleaf hay at the rate of 1 pound per lamb per day. The meal ration was made up as follows: Bran, 100 pounds; whole oats, 100 pounds; oil cake, 50 pounds; and cotton-seed, 50 pounds.

The cost of the different feeds was figured at: Hay, $8 per ton; meal mixture, $1.59 per hundred weight; and roots, $2 per ton.

All lambs were given a preparatory feeding period of two weeks, the better to allow them to become accustomed to their feed and surroundings. The test was started December 14, 1914, and concluded April 1, 1915. Three consecutive weighings were made at the start, and individual weights taken at weekly intervals throughout the test.

Two lambs were lost during the test: One from lot 1 died of pneumonia, and one from lot 4 had a bad case of scours.

The following table gives the results of the test:—

—	Lot 1. Timothy Hay and Meal.	Lot 2. Timothy Hay and Roots and Meal.	Lot 3. Mixture of Timothy and Broad-leaf Hay and Meal.	Lot 4. Mixture of Timothy and Broad-leaf Hay and Roots and Meal.
Number of lambs in lot	11	13	12	12
Number of days in experiment	108	108	108	108
Total weight at beginning of experiment ...lb.	1,000	1,180	1,086	1,098
Total weight at finish of experiment "	1,256	1,588	1,357	1,453
Gain during period "	256	408	271	355
Gain per head "	23·3	31·4	22·6	29·6
Gain per head per day "	·215	·290	·209	·274
Quantity of hay consumed "	1,782	2,106	2,592	2,592
Quantity of meal consumed "	1,339·25	1,582·75	1,461·00	1,461
Quantity of roots consumed "	....	8,528	....	7,872
Total cost of feed $	28·42	42·12	33·60	41·47
Cost of feed per head "	2·58	3·24	2·80	3·46
Cost of feed per head per day ...cts.	2·39	3·00	2·59	3·20
Cost of 1 pound gain "	11·10	10·32	12·39	11·68
Original cost of sheep $	65·00	76·70	70·59	71·37
Original cost of sheep plus cost of feed "	93·42	118·82	104·19	112·84
Selling price at $8 per hundredweight "	100·48	127·04	108·56	116·24
Net profit on lot "	7·06	8·22	4·37	3·40
Net profit on lamb "	0·64	0·63	0·36	0·29

DEDUCTIONS.

While it has been pointed out in the introduction of this experiment that it is not a duplication of the previous year's experiment, there is, however, sufficient similarity in the two to make some interesting comparisons. When such comparisons are made they coincide very well indeed with those experiments of the two previous years. Hence, considerable assurance may be placed on such results. The following are some of the more striking points to be noted.

First.—That while in 1912-13 and 1913-14, the test showed that clover hay surpassed timothy in economy of production, this test shows that timothy surpasses a combination of timothy and broadleaf.

Second.—That where roots are added to the ration, a greater daily gain is obtained, but not sufficient to compensate for the extra cost of production. This holds true in nearly all tests of previous years.

Third.—That in every test where only meal was fed in addition to the hay the greatest profit was realized.

Fourth.—That, notwithstanding the fact that these lambs cost one-half cent a pound more than those of a previous year, a fair profit was realized over and above the cost of feed.

Fifth.—That when the results of three years' feeding of 141 lambs show a gain of from 70·3 to 99·3 cents per head, or an average of 84·5 cents, there is quite a margin of profit.

Sixth.—That roots play a great part when broadleaf is used in the hay ration.

Seventh.—That there is always a ready demand for winter-fed lambs.

NAPPAN.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

SHEEP.

There are seventeen pure-bred Leicesters at the Cap Rouge Station: one ram lamb, five aged ewes, seven shearlings, and four ewe lambs. The flock is not large, but is composed of good, strong sheep. At present it is kept only to furnish breeders at a reasonable cost, but as soon as the piggery is remodelled and made into a good sheep barn, feeding experiments will be started.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

SHEEP.

During the winter months there were purchased, locally, fifty-four grade ewes, with the object of experimenting in the eradication of weeds, such as the orange hawkweed—better known in the townships as the paint-brush, ox-eye daisy, etc.—with which the rough pasture land in this section is badly infested.

A grading experiment is to be carried on, to demonstrate the improvement that can be brought about with the common grade ewes by the use of the best registered rams procurable, for a few years; also with the object of seeing if the quality and clipping of wool cannot be improved by better feeding and dipping of sheep for the destruction of ticks. Six of these ewes were shearlings and were not in lamb. The remaining forty-eight produced sixty good lambs, which will be kept through until next winter for feeding purposes.

Five of these sheep were shorn when purchased, which left a clip of forty-nine fleeces, giving an average of 6·71 pounds per sheep. This was graded and sold through the Wool Growers' Association of the county of Sherbrooke. Prices realized were:—

189 pounds "medium" at 31 cents	$ 58 59
125 pounds "low medium" at 30 cents	37 50
15½ pounds "rejected" at 25 cents	3 87
Total	$ 99 96

This is considered a very good price, and shows the advantage of co-operation among the farmers in the selling of their produce.

Brandon : Sheep grading Experiment, Mongrel range ewes used for foundation stock and Oxford Down ram used for grading up.

Brandon: Sheep grading Experiment, Ewes resulting from first cross of Oxford Down blood on range stock.

Brandon: Sheep grading Experiment, Ewe lambs resulting from second cross of Oxford Down blood on range stock.

Agassiz, B.C. Dorset Horned Ewes and Lambs. Ewes that picked their rations for the past year.

PLATE XLIV

Agassiz, B.C. Dorset Horned Ram, 11 months old. Bred by Heart's Delight Farm, N.Y. Sire of this year's lamb crop. Open fleece due to awkward position as picture was taken.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

SHEEP.

The flock consists of the following animals: Oxford Down: one ram, three aged ewes, three yearling ewes; grade: forty aged ewes, thirteen yearling ewes.

In 1910-11 a start was made at sheep breeding here, by obtaining a small flock of grade ewes. These ewes were part of a shipment bought in by the Manitoba Sheep Breeders' Association from the range districts of southwestern Saskatchewan. They resembled the usual range type of sheep, though they were better than the average. Under good treatment and feeding these ewes have improved greatly in appearance. They have been bred each year to a pure-bred Oxford Down ram. The offspring shows a decided improvement in size and type over the parent ewes.

The season of 1914 was only moderately successful in raising lambs. Forty-four ewes gave birth to fifty-seven lambs, thirty-eight of which were raised. The deaths were mostly due to goitre; a large percentage of the lambs were afflicted with this trouble at birth. Those that did not die in a few days soon recovered from the trouble.

WINTERING OF BREEDING EWES.

The experiment which was tried last year in regard to feed and shelter for ewes was repeated this year. Alfalfa was compared with mixed hay, composed chiefly of Western Rye grass and timothy, and stabling and feeding in the sheep barn was compared with feeding outdoors with an open shed for shelter. The experiment was not started this year until February 2, and was discontinued on March 20. No grain was fed during most of the period as the sheep were fat to begin with. Neither were they fed any straw or roots. Each lot consisted partly of ewes and partly of last spring's ewe lambs.

SUMMARY of Results.

—		Lot 1. Wintered in Open Shed. Fed Alfalfa.	Lot 2. Wintered in Sheep Barn. Fed Alfalfa.	Lot 3. Wintered in Sheep Barn. Fed Mixed Hay.
Number of ewes in lot		14	15	15
Number of lambs in lot		6	5	5
Weight of ewes, February 2	lb.	2,237	2,236	2,158
Weight of lambs, February 2	"	560	520	510
Weight of ewes, March 29	"	2,315	2,313	2,158
Weight of lambs, March 29	"	595	520	480
Gain or loss per ewe	"	Gain 5·6	Gain 5·1	0
Gain or loss per lamb	"	Gain 5·8	0	Loss 6
Amount of alfalfa used	"	4,400	4,400	
Amount of mixed hay used	"	.....	.....	4,400
Amount of oats and bran used	"	85	85	85

While the sheep fed on alfalfa held their own and made slight gains without grain or roots, those fed on the hay lost weight, on the average. These results are similar to those obtained last year and are corroborated by many others in which alfalfa is compared with other hays.

COST OF FEEDING BREEDING EWES.

As in the case of cattle and swine, records are kept of the feed consumed by the sheep. The table which follows shows the feed used by one ewe during the year, and includes the feed of one lamb from birth to weaning at 5 months of age. This is the average of forty-four ewes rather than the individual record of one. On account of the pasture being very bare from the drought last summer, the sheep had to get grain a good part of the summer.

Feed Used by One Grade Ewe in One Year.—(Including Lamb for Five Months).

915 pounds alfalfa hay at $12 per ton	$5 49
234 " oats and bran at $20 per ton	2 34
Total	$7 83

Brandon.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MacBEAN, B.S.A.

SHEEP.

The work with sheep at the Experimental Farm, Indian Head, is receiving considerable attention at present, and increased developments are expected in succeeding years.

The breeding flock is composed of one Shropshire ram, one ram lamb of the same breed, six pure-bred Shropshire ewes, seven grade Shropshire ewes, four grade Shropshire shearling ewes, one Shropshire ewe-lamb, and one grade Shropshire ewe lamb.

During the year two Shropshire ram lambs were sold. Our lamb crop was rather light this past season, while three were unfortunately killed by dogs. Eventually, the dogs met with their deserts, and no lambs have since been worried.

A few pure-bred ram lambs are sold for breeding purposes. As yet no pure-bred ewe lambs are being sold, the intention being to keep them to build up the flock.

The common ewes occupy a very important place, as they demonstrate the fact that it is quite possible to build up a good flock of sheep by commencing with common ewes and a pure-bred ram. The ram must be pure-bred, but that it is unnecessary to buy high-priced ewes is proved by results shown at this Farm. By this method of grading up a flock with the use of a pure-bred ram on a grade ewe followed by mating her progeny with a pure-bred ram of the same breed as the original, it takes only a very few years to develop a grade flock of a standing almost equal to that of a pure-bred flock. On this Farm at present there is a Shropshire-grade lamb which would pass for a pure-bred.

For the outlay invested it is questionable if there is any line of farming more profitable than that of raising sheep. The double source of revenue in the sale of wool and mutton has to be taken into consideration, while the use which sheep can make of waste land, weedy summer-fallows, etc., makes them a valuable factor in better farming.

For the purpose of more extended work with sheep in the pasturing of summer-fallows, etc., out of a carload of lambs bought last fall for experimental feeding, one hundred ewe lambs were selected to be retained on the Farm, thus augmenting the permanent flock. These will be bred next season, and in due course experimental work will be carried on in the feeding of lambs bred on the Farm, and the fattening of bought-in lambs discontinued. Last year's results showed a loss in the latter business, while this year's findings prove there is no money in that line of work, in this district at any rate. It may be possible to make a small profit with lambs bought locally, but not if they are shipped in from a distance.

The problems of destruction by dogs and wolves are, however, difficult to solve. Probably, of the two, the wolves present the greater difficulty. This Farm experienced the ravages of both last fall, three lambs having been worried to death by dogs while, worse still, twenty were destroyed by wolves in a single night. The latter were out of the flock already referred to, bought for experimental feeding, and were killed quite close to the buildings.

Out of 360 lambs bought for experimental feeding, 339 were available for the purpose. One died at Lethbridge before shipping, twenty were killed by wolves as already

indicated, and another had to be destroyed on account of an external malformation. Throughout the test, however, one only was lost, and that by having its neck broken.

Of the 339 lambs bought for experimental feeding the following outline indicates their allocation into different groups. The first four groups refer to the ewe lambs to be kept on the Farm as already noted. These were simply carried through the winter, but not fattened.

LAMB-FEEDING EXPERIMENTS.

Group.	Sub-division.	Method of Handling.	No. of Lambs.	Ration.
1	....	In shed, to be open or shut as considered necessary.	24	Oat straw, alfalfa hay and grain (oats and barley in equal proportions).
2	....	"	25	Oat straw, prairie hay and same grain.
3	....	"	25	Oat straw, prairie hay, same grain and turnips.
4	....	"	25	Oat straw, same grain, and turnips.
5	A	Closed shed..............	25	Barley straw, prairie hay and same grain.
	B	"	25	Barley straw, prairie hay and wheat screenings
6	A	Open shed................	45	Barley straw, prairie hay and grain (oats and barley in equal proportions).
	B	"	45	Barley straw, prairie hay and wheat screenings.
7	A	Protection of straw stack	50	Same as 6A.
	B	"	50	Same as 6B.

Some of the lambs were shipped from Lethbridge, Alta., others were bought locally, while one lamb used in the experiment was bred on this Farm.

INDIAN HEAD.

LAMB FEEDING EXPERIMENTS—*Continued.*

The following table shows the results of our experiments in fattening lambs shipped from a distance. This line of work would not appear to be a profitable one.

Bought at Lethbridge, Alta.	Group 5.		Group 6.		Group 7.	
	Closed Shed.		Open Shed.		No Shed.	
	A	B	A	B	A	B
	Barleystraw prairie hay, and grain (oats and barley in equal proportions).	Barley straw prairie hay, and wheat screenings.	Same as 5A.	Same as 5B.	Same as 5A and 6A.	Same as 5B and 6B.
Number of lambs in experiment.	19	19	22	23	24	25
Number of days in experiment	112	112	112	112	112	112
Total weight at beginning of experiment ... lb.	1,165	1,080	1,275	1,265	1,525	1,530
Total weight at end of experiment ... "	1,445	1,360	1,775	1,755	2,050	2,075
Gain during period ... "	280	280	500	490	525	545
Gain per head ... "	14·9	14·9	22·7	21·3	21·8	21·8
Gain per head per day ... "	·13	·13	·20	·19	·19	·19
Amount of grain eaten by lot ... "	2,484	2,484	3,036	3,174	3,312	3,450
Amount of hay eaten by lot ... "	1,566	1,566	1,914	2,001	2,088	2,175
Amount of straw eaten by lot ... "	1,440	1,440	1,760	1,840	1,920	2,000
Total cost of feed ... $	31·80	31·80	38·83	40·63	42·40	44·15
Cost of feed per head ...	1·67	1·67	1·76	1·76	1·77	1·77
Cost of feed per head per day ... "	·01	·01	·01	·01	·01	·01
Cost of feed per 1 pound gain ... "	·11	·11	·07	·08	·08	·08
Original cost of lambs ... "	92·03	85·32	100·72	99·93	120·47	120·87
Original cost of lambs plus cost of feed ... "	123·83	117·12	139·55	140·56	162·87	165·02
Total receipts from sale ... "	113·43	106·76	139·33	137·76	160·92	162·88
Net loss on lot ... "	10·40	10·36	·22	2·80	1·95	2·14
Net loss per lamb ... "	·55	·54	·01	·12	·08	·08

This next table gives the results of our feeding of lambs bought locally. These are more encouraging than the former.

INDIAN HEAD.

LAMB FEEDING EXPERIMENTS—*Continued.*

Bought Locally.	Group 5.		Group 6.		Group 7.	
	Closed Shed.		Open Shed.		No Shed.	
	A	B	A	B	A	B
	Barley straw prairie hay, and grain (oats and barley in equal proportions.)	Barleystraw prairie hay, and wheat screenings.	Same as 5A.	Same as 5B	Same as 5A and 6A.	Same as 5B and 6B.
Number of lambs in experiment	6	5	23	22	25	25
Number of days in experiment	112	112	112	112	112	112
Total weight at beginning of experiment.... lb.	435	395	1,445	1,445	1,800	1,780
Total weight at end of experiment ...... "	520	465	1,990	1,940	2,220	2,230
Gain during period ...... "	85	70	545	495	420	450
Gain per head ...... "	14·16	14	23·6	22·5	16·8	18
Gain per head per day.. "	·12	·12	·20	·20	·15	·16
Amount of grain eaten by lot ...... "	828	690	3,174	3,036	3,450	3,450
Amount of hay eaten by lot ...... "	522	435	2,001	1,914	2,175	2,175
Amount of straw eaten by lot ...... "	480	400	1,840	1,760	2,000	2,000
Total cost of feed ...... $	10·60	8·83	40·63	38·83	44·15	44·15
Cost of feed per head.... "	1·76	1·77	1·76	1·76	1·77	1·77
Cost of feed per head per day ...... "	·01	·01	·01	·01	·01	·01
Cost of feed per 1 pound gain ...... "	·12	·12	·07	·07	·10	·09
Original cost of lambs.. "	29·36	24·63	97·53	97·53	121·50	120·15
Original cost of lambs, plus cost of feed ...... "	39·96	33·46	138·16	136·36	165·65	164·30
Total receipts from sale.. "	40·82	34·14	155·43	152·29	174·27	175·05
Net profit on lot ...... "	·86	·68	17·27	15·93	8·62	10·75
Net profit per lamb ...... "	·14	·13	·75	·72	·35	·43

This last table summarizes our results with the fattening of the lamb bred on this Farm. This lamb was a pure-bred Shropshire wether which, though a good lamb, would not have been an ideal ram, and was therefore put into the feeding lot.

Indian Head.

LAMB FEEDING EXPERIMENTS —*Concluded.*

Lamb bred on Farm.		Ration. Barley straw, prairie hay, and wheat screenings.
Number of lambs in experiment		1
Number of days in experiment		112
Total weight at beginning of experiment	lb.	85
Total weight at end of experiment	"	110
Gain during period	"	25
Gain per day	"	·22
Amount of grain eaten	"	138
Amount of hay eaten	"	87
Amount of straw eaten	"	80
Total cost of feed	$	1.76
Cost of feed per day	"	·01
Cost of feed per 1 pound gain	"	·07
Original cost of lamb	"	5.10
Original cost of lamb, plus cost of feed	"	6.86
Total receipts from sale	"	8.63
Net profit on lamb	"	1.77

We can only emphasize the conclusion arrived at last year, and this is: There is little or no profit in buying lambs and feeding for market.

It is evident, however, that the feeding of home-bred lambs would be a profitable undertaking. The intention, therefore, of fattening our own lambs in future is one which ought to be followed with good success.

Indian Head.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.

SHEEP-FEEDING EXPERIMENT.

In order to get more conclusive data on the possibilities of fattening range lambs, a continuation of the work of the past three years was followed, with some modifications.

Four hundred and eighty range lambs were purchased last November from Raymond Knight, of Raymond, Alta. A premium was paid for the tops, which brought the price up to $4.12½ per head. The lambs were run on stubble for almost a month, and were then divided equally into two lots of 240 (a good carload in each) and fed alfalfa, and alfalfa and oat sheaves, respectively, for eighty days, when they were sold to the Vancouver & Prince Rupert Meat Company at 8 cents per pound (no shrink) less half per cent for insurance.

As in previous years, the lambs were fed in a wire corral with an open shelter shed on the west end. They were fed twice daily and had free access to water.

The results are based on the same arbitrary feed values as have been used in the past few years, and they are:—

Alfalfa, $12 per ton.
Oat sheaves, $10 per ton.
Whole grain (equal parts of oats and barley), $20 per ton.
Salt at actual cost.

SHEEP-FEEDING experiment, 1914-15.

		Group I.	Group II.
Number of lambs in lot at beginning of period		240	240
Number of days in experiment		80	80
Total weight at beginning of experiment	lb.	1,6077	16,300
Average weight at beginning of experiment	"	66·98	67·91
Total weight at end of period	"	20,130	21,050
Gain for period	"	4,053	4,750
Gain per head for period	"	16·89	19·79
Gain per head per day	"	·021	·024
Quantity of meal fed to lot for period	"	6,885	6,885
Quantity of alfalfa fed to lot for period	"	42,780	30,616
Quantity of oat sheaves fed to lot for period	"	....	13,133
Quantity of salt fed to lot for period	"	188	189
Total cost of feed	$	327·41	320·10
Cost of feed per head for period	"	1·36	1·33
Cost of feed per head per day	cts.	1·7	1·6
Cost to produce 1 pound gain	"	8·07	6·74
Original cost of lambs at $4.12½ per head	$	990.00	990.00
Original cost plus cost of feed	"	1,317.41	1,310.10
Selling price at $7.96 per cwt. (sold at stock yards with 2·16 per cent shrink)	"	1,567.72	1,639.35
Net profit on group	"	250.31	329.25
Net profit per head	"	1.04	1.37

DEDUCTIONS.

As the arbitrary values used in compiling the results just given are quite different from the actual prices prevailing for feeds this past winter, another table is here presented, based on the following values, which closely correspond with the local market conditions for most of the winter:—

Alfalfa (in stack)	$ 8.00	per ton
Oat sheaves (in stack)	10.00	"
Grain (equal parts of oats and barley)	35.00	"

Green oat sheaves are $2 a ton more than alfalfa, because it is less common on the irrigated farms in the district, where alfalfa hay can be produced cheaper. Without doubt it is more profitable to grow alfalfa hay for $8 per ton, on irrigated land, than oat sheaves at $10 per ton. The actual cost of labour in experimental work is considerably higher than what it would be with the average farmer. However, it is generally stated by "sheepmen" that one man with a team can look after one thousand head. On this basis, by allowing $50 per month for the man, it would cost $87.50 to look after five hundred head for 3½ months.

		Group I.	Group II.
Cost of 240 lambs	$	990.00	990.00
Cost of feed	"	293.49	310.50
Cost of labour (estimated)	"	43.75	43.75
Interest on investment at 8 per cent	"	23.10	23.10
Total	"	1,350.34	1,367.35
Selling price	"	1,567.72	1,639.35
Net profit per group	"	217.38	272.00
Net profit per head	"	.90½	1.13

It will be seen from the foregoing tables that group II, receiving the ration of two-thirds alfalfa and one-third oat sheaves, ate more roughage and made more gains, with the result that they returned more profits. The results of the experiment are only further proof of the greater profit in marketing crops "on the hoof" rather than in the ordinary way.

LETHBRIDGE.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

SHEEP.

The number of sheep owned by this Station at present is nineteen head, composed of eighteen common grade ewes and one pure-bred Shropshire ram. These ewes are typical of the class of sheep being brought in, in large numbers, from the southern part of the province, and from Montana. They are principally Merino and Rambouillet crosses, and are being bred to a Shropshire ram with the object of determining what improvement, if any, can be effected in the quality of the wool and in the weight of lambs at birth and at 6 months of age. These sheep are now heavy in lamb and should begin to drop their lambs about the middle of April.

The cost of carrying such a small flock of sheep through the winter on a farm where a large number of other stock is kept is difficult to determine, for a flock of this size will follow cattle and rustle their living without feed consumed by them being missed. This flock followed the bunch of twenty steers which were fed in the corral, and came through in good condition on the amount of feed they were able to gather from that wasted by the steers. From the figures previously secured it is probably safe to assume that the cost per head for a large flock would not be greater than 2 cents per day. If prairie hay was available at a cost of $3 per ton, which in outlying districts is a fair price, the cost per head would be less.

EXPERIMENTAL FARM, AGASSIZ, B. C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

SHEEP.

No experimental work was done with the sheep this year for two reasons: first, the lack of accommodation; and second, the very poor lambing results in the spring of 1914, due to the ewes being over-fat.

During the year, twenty Dorset Horned ewes and one ram lamb were kept. The ram was purchased in the autumn from Heart's Delight Farm, Chazy, N.Y., and is an excellent specimen of the breed.

The flock has been run to pasture the entire year, and has gathered food, both in summer and winter, that would otherwise have been wasted. This being the case, we consider that the up-keep of the sheep did not cost us anything beyond the value of 50 pounds of salt for the whole year. The sheep were housed in a gravelly knoll in a temporary shed, which cost $8 to erect. All the sheep were in good shape, but they were not allowed to become too fat. At the time of writing, they are in excellent condition, carrying heavy fleeces. About one-third of the ewes have lambed up to the present, and have given 200 per cent of lambs, all of which are living and strong. The lambs are coming later this year, on account of the thirty-day quarantine, which was imposed upon our ram at the time of purchase.

We have had no losses from disease this year, and every eligible ewe proved a breeder. There have been no losses from wild animals, but one lamb was killed by a dog.

Mr. A. McKay, farm foreman, acted as shepherd throughout the year, and the good condition of the flock testifies to his careful attention.

This is an important branch of live stock in British Columbia, and deserves more attention than we have been able to give it in the past.

SWINE.

CENTRAL EXPERIMENTAL FARM OTTAWA, ONT.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN, E. S ARCHIBALD, B.A., B.S.A.

There are 220 head of swine of all breeds and ages now on the Central Experimental Farm. These are used for experimental breeding, feeding, and housing, as well as for sales of high-class breeders at a reasonable figure. The breeds kept are Berkshire, Tamworth, and Yorkshire.

The Berkshires are thirty-six in number, including eleven breeding sows, twenty-three young pigs, and two boars.

The Tamworths are forty-six in number, including nine breeding sows, thirty-six young pigs, and one boar.

The Yorkshires are 138 in number, including thirty-seven breeding sows, ninety-eight young pigs, and three boars.

The main piggery, erected in 1910, continues to give excellent satisfaction in all respects, both for experimental feeding work and also in its uses for the farrowing season, feed rooms, and the like. The housing of brood sows, during both winter and summer, in the single-board cabins has also continued to give good results.

The increasing sales and demand from individual farmers and agricultural societies for young breeding pigs may again be reported, and is a healthy indication of the added interest of the farmers, both in the Experimental Farms and in the swine industry.

PIG-FEEDING EXPERIMENTS.

A number of feeding experiments with pigs of all ages were carried on during the summer of 1914 and the winter of 1914-15. Experiments which have been completed to date are herein reported on.

SUMMER FEEDING OF SHOATS IN PADDOCKS.

Experiment No. 1.

The objects of this experiment were as follows:—

(1) To determine the best method of summer feeding of young pigs 12 weeks of age and over, which had been weaned at the commencement of the experiment.

(2) To determine the value of rape as green feed for young pigs.

(3) To determine the value of the hopper grinder self-feeder in the summer feeding of pigs.

As many pigs as could be conveniently accommodated in each paddock were included in each of the lots on this experiment.

Lot 1 was fed a grain mixture composed of equal parts of shorts, ground oats, and ground corn, fed as a skim-milk slop.

Lot 2 received the same grain mixture, as a skim-milk slop, plus all the green rape which they would clean up. This amounted to a small fraction less than 5 pounds per head per day during the experiment.

Lot 3 received the shorts and ground oats as lots 1 and 2, namely, as a skim-milk slop. The corn for lot 3 was placed whole in the hopper grinder. The amount of corn placed in the grinder per week was exactly one-third of the total grain ration which this lot received, hence the total composition of the grain received was the same as in lots 1 and 2.

Samples of feed were taken for chemical analyses, for which readers are referred to the report of the Dominion Chemist.

The animals were weighed once every fortnight, individual weights being kept. The feed was also weighed throughout the experiment.

VALUATION OF FOODSTUFFS.

The following valuations were placed on the meals and forages consumed:—

Meal mixture..	Per ton.	$ 28 00
Green rape..	"	3 00
Skim-milk..	"	4 00

EXPERIMENT No. 1.

Lot.		1	1A	Average 1 and 1A	2	3
Feed given.		Shorts, Oats, Corn, and Skim-milk.	Same as Lot 1.	Same as Lot 1.	Shorts, Oats, Corn, and Skim-milk. / Green Rape.	Shorts, Oats, and Skim-milk. / Corn.
How fed.		Slop.			Slop.	Slop. / Grinder.
Number of animals in each group..................		7	9	8	7	8
First weight gross, August 24, 1914.........	lb.	671	519	595	771	829
First weight average, August 24, 1914.......	"	95·8	57·6	76·7	110·1	103·6
Finished weight gross, November 2, 1914...	"	1,252	1,237	1,244·5	1,259	1,466
Finished weight average, November 2, 1914	"	178·8	137·4	158·1	179·8	183·2
Number of days in experiment.....................		70	70	70	70	70
Total gain per period..................................		581	718	649·5	488	637
Average gain per animal....................	"	83	79·77	81·38	69·7	79·62
Average daily gain for group...............	"	8·3	10·25	9·27	6·97	9·1
Average daily gain per animal..............	"	1·18	1·13	1·15	·995	1·13
Quantity of meal eaten by group for period..	"	2,273·88	2,280	2,276·9	1,678	2,445
Quantity of roughage (green rape) eaten by group for period........................	"	....	....	....	2,354	....
Quantity of milk eaten by group for period.	"	1,678	2,047	1,862·5	1,707·7	1,837
Total cost of feed..................................	$	35.18	36.01	35.59	30.43	37.90
Cost of feed per head........................	"	5·02	4·00	4·51	4·34	4·73
Cost of feed per head per day..............	cts.	7·1	5·7	6·4	6·2	6·7
Cost to produce 1 pound gain...............	"	6·0	5·0	5·5	6·2	5·9

DATA FROM EXPERIMENT.

In this experiment the following features are worthy of note:—

(1) The greatest gains in the experiment were made in lots 1 and 1A, where the grains were all fed in the skim-milk slop.

(2) The lowest cost of feed per head was in lot 2, on green feed. This was not the cheapest feeding, as this lot cost more per pound gain than any other lot.

OTTAWA.

(3) All the pigs above included in all the lots remained in good health throughout the experiment; hence the influence of rape as a laxative, and the influence of the hopper grinder to supply exercise were not demonstrated.

One pig in lot 1 died when forty-eight days on experiment. One pig in lot 2 died when thirty-eight days on experiment. Both these individuals were unthrifty from the start and made practically no gains while on the experiment. The loss of these individuals was not due to the foodstuffs in any way.

(4) Green feed as rape, fed at the rate of about 5 pounds per head per day, did not, in this experiment, prove economical in replacing the grain mixture under the above conditions. Comparing the average of lots 1 and 1A with lot 2 it will be noticed that 39 pounds of meal mixture gave the same returns as 3,138 pounds of rape and 414 pounds of milk. Hence the feeding of rape was not only a loss, but in this experiment showed a loss of 28 cents on the value of the milk.

(5) Green feed as rape does not contain nearly the same value as green feed in the shape of fresh cut clover. (For comparative purposes see annual report for 1912.)

(6) The hopper grinder may be used economically to grind a part of the grain ration. Previous tests in 1913 show that 4-month pigs cannot make economical gains, if any, when compelled to get all their ration from the hopper grinder.

(7) In the above experiment an average of lots 1 and 1A showed 7 per cent cheaper gains than lot 3, working on the hopper grinder. This, however, does not credit the grinder for the cost of grinding the corn, approximately $2 per ton, or the slightly less labour in feeding lot 3.

On the other hand, the labour of grinding required the pigs to consume about 10 per cent more meal and milk, with slightly less gain per head, hence the 7 per cent cheaper gains in lots 1 and 1A.

Experiment No. 2.

GRAINS FOR WEANING PIGS FED OUTSIDE.

The problem which is confronting farmers who intend to go fairly heavily into hog production is the raising of young pigs to the age of 3 or 4 months on a limited quantity of dairy by-products or even without the help of skim-milk, buttermilk, or whey. This difficulty is more particularly noticed in winter and autumn, although it applies also to summer feeding. To gain information as to the best meals and meal mixture for the purpose of substituting dairy by-products, two experiments were conducted in the year 1904 during the months of January, February, and March. Readers are referred to the report for the year 1904 regarding this matter.

During the summer and fall of 1914 another experiment along somewhat different lines but relating to the same subject was conducted at the Central Experimental Farm. The objects of this experiment were: (1) To determine a good grain ration for young pigs as soon as they start eating until the age of 3 or 4 months; (2) to compare oil meal and Swift's Digester Tankage in such rations; (3) to determine the value of skim-milk as compared with Swift's Digester Tankage used in other rations as a supplement; (4) to compare single meals *versus* a meal mixture of two and three meals with and without skim-milk in the feeding of young pigs previous to and directly after weaning.

This experiment was conducted in the outside feeding pens, where the pigs had the shelter of the single-board hog cabins.

PLAN OF EXPERIMENT.

A litter of pigs was chosen for each lot in this experiment before weaning.

Lot 1 (Yorkshires) were fed a ration composed of skim-milk and a grain mixture made up of three parts of finely ground corn, three parts of shorts, and one part of linseed oil cake meal. All the pigs in this lot remained healthy during the experiment.

OTTAWA.

Lot 2 (Tamworths) were fed a ration composed of skim-milk and a grain mixture made up of finely ground corn, three parts; shorts, three parts; and Swift's Digester Tankage, one part. One pig in this lot died suddenly on October 16, 1914. Although this animal was not of as rugged a type as the other pigs in lot 2, yet he was a fairly good individual. An examination revealed inflammation of the lining of the stomach, and slight bloating. Apparently the trouble was due to individual weakness rather than to the foodstuffs, as all the other animals remained healthy during the experiment.

Lot 3 (Berkshires) were fed a ration composed of skim-milk and a meal mixture made up of finely ground corn, six parts, and Swift's Digester Tankage, one part. All the pigs remained very healthy throughout the experiment.

Lot 4 (Tamworths and Yorkshires) were fed on a ration composed of finely ground corn, six parts; and Swift's Digester Tankage, one part, with no skim-milk. All the pigs remained healthy throughout the experiment.

Lot 5 (Berkshires) were fed on a ration composed of skim-milk and finely ground corn. All the pigs remained healthy throughout the experiment.

All the pigs were weaned at 63 days of age, and were fed the above grains previous to and just after weaning.

Samples of feed were taken for chemical analyses, for reference to which readers are referred to the report of the Dominion Chemist.

The animals were weighed once every fortnight, individual weights being kept. The feed was also weighed throughout the experiment.

VALUATION OF FOODSTUFFS.

The following valuations were placed on the meals and other foodstuffs consumed:—

Corn	Per ton.	$ 28 00
Shorts	"	28 00
Skim-milk	"	4 00
Swift's Digester Tankage	"	50 00

EXPERIMENT NO. 2.

Lot.		1	2	3	4	5
Feed.		Corn, 3 parts Shorts, 3 parts Oil meal, 1 part Skim-milk.	Corn, 3 parts Shorts, 3 parts Tankage, 1 part Skim-milk.	Corn, 6 parts Tankage, 1 part Skim-milk.	Corn, 6 parts Tankage, 1 part Skim-milk.	Corn, Skim-milk.
Number of animals in each group		6	4	7	6	6
First weight gross, August 26, 1914	Lb.	84	95	166	84	78
First weight average, August 26, 1914	"	14	23·7	23·7	14	13
Finished weight gross, November 18, 1914	"	538	400	730	306	468
Finished weight, average, November 18, 1914	"	89·66	100	104·2	51	78
Number of days in experiment		84	84	84	84	84
Total gain per period	Lb.	454	305	564	222	390
Average gain per animal	"	75·66	76·25	80·57	37·	65
Average daily gain for group	"	5·44	3·6	6·7	2·6	4·6
Average daily gain per animal	"	·9	·9	·95	·43	·76
Quantity of meal eaten by group for period	"	616·3	532·3	890	518·4	653
Quantity of tankage eaten by group for period	"	....	88·9	149	86·53	....
Quantity of milk eaten by group for period	"	1,698·2	1,780·8	2,034	....	1,647
Quantity of oil meal eaten by group for period	"	102·7	....	....	....	....
Total cost of feed	$	13.90	13.23	20.24	9.41	12.43
Cost of feed per head	"	2.31	3.31	2.89	1.56	2.07
Cost of feed per head per day	Cts.	2·7	3·9	3·4	1·8	2·4
Cost to produce 1 pound gain	"	3·06	4·3	3·5	4·23	3·1

DATA FROM EXPERIMENT.

This experiment has not been duplicated as yet, but the following data from the first trial are worthy of note. It is proposed to repeat this experiment in 1915-16.

1. The greatest total gains per pig placed the lots in the following order: Lots 3, 2, 1, 5, 4.

2. The cheapest gains per pig placed the lots in the following order: Lots 1, 5, 3, 4, 2.

3. Comparing lots 1 and 2, it is seen that linseed oil meal and Swift's Digester Tankage produced almost identically the same total gains in rations of that kind, containing a good variety and nutritive balance. The greater cost of tankage thus makes the feed for lot 2 much more expensive and the profits proportionately less.

4. Comparing lots 2 and 3, it is seen that three parts of corn replacing the three parts of shorts produced greater gains. This was due to the greater quantities of both grain and milk consumed by lot 3, and whether due to the individual capacity of the animals or to the palatability of the foodstuffs, only succeeding experiments will show. However, 478 pounds of shorts, plus 9 pounds of tankage, plus 1,170 pounds of skim milk gave the same returns as 412 pounds of corn. Valuing shorts at $28, tankage at $50, and skim-milk at $4 per ton, finely ground corn thus had a valuation of $44.80 per ton.

5. Comparing lots 3 and 4, it is seen that greater and cheaper gains followed the addition of skim-milk to the corn and tankage ration. It is shown that 405 pounds of corn plus 69 pounds of tankage give the same gains as 2,034 pounds of skim-milk; or, at the above valuation of corn and tankage, milk in this ration acquires a value of $7.30 per ton, or 37 cents per hundredweight.

6. Comparing lots 3 and 5, it is seen that tankage added to a corn and skim-milk ration induces greater though slightly more expensive gains. The greater gains from the addition of tankage is probably due to the greater variety, thus causing the pigs to consume greater quantities of both the mixed meal and skim-milk. It is seen that 24 pounds of corn plus 271 pounds of skim-milk give the same gains as 149 pounds of tankage; or, at the above valuations for corn and skim-milk, tankage in this ration has only a valuation of $11.80 per ton.

7. Comparing lots 4 and 5, it is seen that tankage alone is not an entirely satisfactory substitute for skim-milk in the corn feeding of young pigs. The tankage-fed pigs made much smaller gains, and nearly 40 per cent more expensive gains. It is seen that 227 pounds of corn plus 146 pounds of tankage are required to take the place of 1,647 pounds of skim-milk. When corn has a valuation of $28 per ton, and skim-milk $4 per ton, tankage thus has a value of only $3.01 per ton.

8. Although tankage did not replace skim-milk either as to total or economical gains, yet the above experiment shows that where gains can be made at only 4·23 cents per pound Digester Tankage can be successfully used in limited quantities as at least a partial substitute of skim-milk, when it can be purchased at $50 per ton or less and where dairy by-products are not available.

9. In general appearance, lots 1, 2, and 3 were the best. Lot 5 made very good gains and very cheaply, but all animals showed lack of growth of bone as found in the first three lots. Lot 4 was even more deficient in growth, all animals being a little stunted and lacking the capacity for larger quantities of feed and the growth to finish prime hogs at an early age.

Experiment No. 3.

ELEVATOR SCREENINGS FOR FATTENING SWINE.

This experiment was conducted on the suggestion of the Seed Branch, Department of Agriculture. The materials were supplied by the Seed Branch in order to obtain

data regarding this matter. Readers are referred for further information regarding the materials to the report of the Seed Commissioner, Mr. G. H. Clark.

The needs of some experimental evidence to show the value of the elevator screenings from our many large elevators in Canada is illustrated by the fact that over 35,000 tons of screenings were shipped to the United States from Fort William alone in the year ending August 31, 1913. It is a fact that a large part of these screenings should never have reached the elevators, but should have been retained on the farms to supply cheap, useful foodstuffs for the farm animals.

ANALYSIS OF ELEVATOR SCREENINGS.

The following botanical analyses were supplied by the Seed Commissioner:—

A composite sample from 6,000 tons of elevator screenings gave the following separations: 37 per cent scalpings, 7 per cent succotash flax, 18 per cent buckwheat screenings, 38 per cent blackseeds.

Scalpings.—65 per cent wheat; 25 per cent other grains; 3 per cent weed seeds; 7 per cent straw and chaff. Considered excellent feed—no immediate need to investigate its value.

Succotash Flax.—30 per cent flax; 40 per cent broken wheat; 15 per cent weed seeds, chiefly wild buckwheat, lamb's quarters, and wild oats; 15 per cent chaff.

Buckwheat Screenings.—58 per cent wild buckwheat; 29 per cent broken wheat; oats, and flax; 9 per cent weed seeds; 4 per cent chaff.

Black Seeds.—Before analysing this material a separation was made of it by means of the 1/25-inch perforated zinc sieve.

The 38 per cent black seeds was thus separated into 7 per cent which passed through the 1/25-inch sieve and 31 per cent above it.

Of the portion passing through the 1/25-inch sieve, 22 per cent was tumbling mustard, 63 per cent dust, 10 per cent lamb's quarters, and 5 per cent other weed seeds.

Of the portion passing over the 1/25-inch screen, 53 per cent was lamb's quarters, 3 per cent wild mustard, 8 per cent other mustard, 9 per cent other weed seeds, and 27 per cent chaff.

OBJECTS OF EXPERIMENT.

(1) To determine the value of a well-balanced ration in the winter feeding of young pigs for market.

(2) To compare this well-balanced ration with the elevator by-product black seeds.

(3) To determine the value of black seeds fed in conjunction with roots and skim-milk as compared with black seeds fed in water only.

(4) To determine the value of buckwheat screenings in swine feeding.

(5) To compare with the well-balanced ration, buckwheat screenings, black seeds with and without milk and roots, and the value of complete elevator screenings in conjunction with feed flour (Ogilvie's "Noxol.")

PLAN OF EXPERIMENT.

All the lots were fed in the main piggery, housed to best advantage for winter feeding. Lots of four each were fed in duplicate. The following tables represent the totals and averages for each lot and its duplicate.

The first five lots of pigs received water, roots, and skim-milk in the same quantities per pig. Lot 6, however, received no roots or skim-milk, but only the black seeds and water. The object of this was to determine whether or not the black seeds had a poisonous effect upon young pigs, and whether they would supply sufficient food to maintain life.

Lot 1 (Yorkshires and Berkshires) received a grain ration composed of shorts, three parts; finely ground corn, three parts; and oil meal, one part. This is the standard meal mixture for this experiment, and is termed "meal" throughout.

Lot 2 (Yorkshires and Berkshires) were fed a mixture of meal, one part, and finely ground black seeds, one part.

Lot 3 (Yorkshires, Berkshires, and Tamworths) were fed finely ground black seeds.

Lot 4 (Yorkshires and Berkshires) were fed finely ground buckwheat screenings.

Lot 5 (Berkshires and Tamworths) were fed complete elevator screenings, three parts, and Ogilvie's "Noxol" flour, one part.

Lot 6 (Yorkshires) were fed finely ground black seeds and water without milk and roots.

Samples of all grains and the various screenings were taken for chemical analyses. Readers are referred to the report of the Dominion Chemist.

Individual weights of pigs were taken every two weeks throughout the experiment. The feed also was weighed regularly.

VALUATION OF FOODSTUFFS.

The following valuations were placed on the meals and the other feeds consumed:—

Meal mixture (corn, shorts, and oil cake)	Per ton.	$ 28 00
Buckwheat screenings	"	14 00
Complete elevator screenings	"	10 00
Finely ground black seeds	"	4 00
Ogilvie's "Noxol" flour	"	28 00
Roots	"	2 00
Skim-milk	"	4 00

The above valuations for elevator products were taken as a fair standard for comparison.

EXPERIMENTAL Period.

Lot.	1	2	3	4	5	6
Feed.	Meal, Milk.	Meal, Blackseeds, Milk.	Blackseeds, Milk.	Buckwheat Screenings, Milk.	Complete Screenings, Flour, Milk.	Blackseeds and Water.
Number of animals in each group	8	8	8	8	8	4
First weight gross Lb.	861	980	835	842	594	638
First weight average "	107	122	104	105	74	159·5
Finished weight gross "	1,205	1,237	881	1,145	754	640
Finished weight average "	151	154	110	143	94	160
Number of days in experiment	42	42	42	42	42	42
Total gain for period Lb.	344	257	46	303	160	2
Average gain per animal "	44	32	6	38	20	·5
Average daily gain for group "	8·40	6·08	1·12	7·2	3·84	·04
Average daily gain per animal "	1·05	·76	·14	·90	·48	·01
Quantity of meal eaten by group for period "	866	864	432	775	481	360
Quantity of roots eaten by group for period "	324	324	290	324	324	....
Quantity of skim-milk eaten by group for period "	1,354	1,354	1,209	1,354	1,354	....
Total cost of feed $	15.13	9.89	3.52	8.43	6.49	.72
Cost of feed per head "	1.89	1.24	.44	1.05	.81	.18
Cost of feed per head per day Cts.	4·5	3·1	1	2·5	1·9	·42
Cost to produce 1 pound gain "	4·7	3·8	7·6	2·7	4·0	36·

DATA FROM EXPERIMENTAL PERIOD.

The following deductions might fairly be taken from this experimental period:—

(1) The order of the various lots in relation to greatest gains is as follows: 1, 4, 2, 5, 3, 6.

(2) The order of the cheapest gains per lot is as follows: 4, 2, 5, 1, 6, 3.

(3) Comparing lot 1 (a well-balanced, palatable ration) with lot 2 (where half the meal was replaced by black seeds), it is seen that nearly one-third less gains were made but the gains were about one-quarter cheaper due to the low cost of the black seeds. It is seen that 287 pounds of meal gave the same gains as 573 pounds of black seeds plus 108 pounds of roots plus 451 pounds of skim-milk. Hence, at the above valuations of meal, milk, and roots, black seeds in this ration would have a value of $10.50 per ton.

(4) Comparing lots 1 and 3, it is found that lot 3 gave extremely small gains (smaller than should have been made on roots and milk alone, and at a higher cost per pound gain). It is seen that 860 pounds of meal gave the same gains as 3,316 pounds of black seeds, 1,909 pounds of roots, and 7,955 pounds of milk. At the above valuations of meal, roots, and milk, black seeds in this ration are quite useless, the 1½ ton of black seeds not only having no feeding value but actually causing a loss of $4.98 on the value of the roots and milk of lot 3.

(5) Comparing lots 2 and 3, it is seen that when the meal is completely replaced by the black seeds, only one-sixth of the gains are made, and these gains at just double the cost per pound. In other words, 460 pounds of meal would give the same gains as 1,916 pounds of black seeds plus 1,217 pounds of roots plus 5,295 pounds of milk. In

other words, at the above valuations of skim-milk, roots, and meal, the black seeds are of no value, and even cause a loss on the value of the milk and roots of lot 3, amounting to $5.42.

(6) Comparing lots 1 and 6, it is seen that lot 6 on water and black seeds alone made practically no gains, but merely maintained weight for forty-two days. It would thus appear that in lot 2 the milk, roots, and meal plus 70 pounds of black seeds, the former three elements of the ration, are responsible for fairly large and cheap gains.

(7) Comparing lots 3 and 6, it is seen that the milk and roots of lot 3 are altogether responsible for the gains. With milk and roots at the above valuations, black seeds fed thus have only a valuation of 65 cents per ton.

To summarize the value of black seeds in this experiment, it is safe to say that the food value of this by-product is low even when fed in small quantities in a well-balanced ration containing good variety; that it has little food value when fed alone or in conjunction with only one or two other foodstuffs; that animals of 160 pounds weight can be made to eat 2 pounds each per day and thus maintain weight for a short period of about 1½ month: that this product is rather unpalatable and, if constituting any considerable proportion of the grain ration, is unpleasant to the animals.

(8) Comparing lots 1 and 4, it is seen that lot 4 on buckwheat screenings produced the second largest gains, made the cheapest gains at the lowest cost, and proved buckwheat screenings to be worth about the same as the meal mixture. It is seen that 866 pounds of meal gave the same gains as 852 pounds of buckwheat screenings plus 32 pounds of roots plus 135 pounds of skim-milk. At the above valuations of meal, roots, and skim-milk, buckwheat screenings thus have a valuation of $27.60.

(9) Comparing lots 1 and 5, it is seen that much smaller gains were made where the complete elevator screenings and feed flour constituted the total grain ration. Nevertheless, the low valuation of the screenings shows that cheaper gains can be made, for a short period, than with the meal mixture. It is seen that 866 pounds of meal gave the same gains as 740 pounds of screenings, 250 pounds of feed flour, 325 pounds of roots, and 1,350 pounds of skim-milk. At the above valuations for meal, roots, and skim-milk, a mixture of elevator screenings, three parts, and feed flour, one part, is worth $18.40 per ton.

OTTAWA.

FINISHING PERIOD.

Owing to the limited quantities of elevator screenings and by-products, the experimental period was only conducted for forty-two days. At the end of this time all six lots were placed on a finishing period preparatory to marketing. All the lots were given the standard meal mixture, similar to that given to lot 1 of the experimental period. All the lots were given roots and skim-milk except lot 6.

FINISHING Period.

Feed given.	Meal—all same mixture.					
Lot.	1	2	3	4	5	6
Number of animals in each group	7	8	8	8	8	4
First weight gross ... Lb.	1,084	1,237	881	1,145	754	640
First weight average ... "	155	154	110	143	94	160
Finished weight gross ... "	1,254	1,530	1,176	1,428	972	852
Finished weight average ... "	179	191	147	178	121	213
Number of days in experiment	42	42	42	42	42	42
Total gain for period ... Lb.	170	293	295	283	218	212
Average gain per animal ... "	24	37	37	35	27	53
Average daily gain for group ... "	2·49	7·04	7·04	6·64	5·12	5·04
Average daily gain per animal ... "	·57	·88	·88	·83	·64	1·26
Quantity of meal eaten by group for period ... "	712	1,001	798	938	537	712
Quantity of roots eaten by group for period ... "	245	310	310	310	310	....
Quantity of milk eaten by group for period ... "	1,177	1,290	1,290	1,290	1,290	....
Total cost of feed ... $	12.55	16.90	14.05	16.02	10.34	9.96
Cost of feed per head ... "	1·79	2.11	1.76	2.00	1.29	2.49
Cost of feed per head per day ... Cts.	4·3	5·0	4·2	4·7	3·0	5·92
Cost to produce 1 pound gain ... "	7·3	5·7	4·7	5·6	4·7	4·69

DATA FROM FINISHING PERIOD.

The increased age of the various lots in the finishing period would naturally be conducive toward less gains per day, and at a greater cost. This is demonstrated in lot 1, which in both the experimental and the finishing period received the same ration.

Lot 1 in the experimental period showed an average gain of 1·05 pound per pig per day, and only ·57 pound per pig per day in the finishing period. This lot stood highest in the experimental period for greatest daily gains, but stood lowest in the finishing period for daily gains. It would appear natural that the other five lots, which received much poorer rations in the experimental period, would respond more readily to a finishing period than would lot 1. One Yorkshire barrow died suddenly at the commencement of the fourth week of the finishing period. This animal had not shown any gains from the commencement of this period. Evidently the trouble was with the individual, as all the other animals in this lot made fairly satisfactory gains throughout the finishing period.

Lot 2 made greater gains, but at somewhat greater cost per pound gain, on the good feed of the finishing period.

Lot 3 made over six times the daily gain, and at only three-fifths the cost, on the superior feed of the finishing period.

Lot 4 made less gains, and at a much greater cost, on the finishing period. The actual palatability and balance of the ration of lot 4 on the experimental period was apparently about as good as lot 1 on the same period or lot 4 on the finishing period, hence the similarity to lot 1 in the results of the change of feed.

Lot 5 made one-half greater gains, and at only slightly greater cost, on the superior feed of the finishing period.

Lot 6 showed the most marked change of any. The most rapid gains of the whole experiment were made by lot 6 when changed from the ration of black seeds and water in the experimental period to the standard meal mixture and water in the finishing period. The cost of gains was also materially lowered in the finishing period. Attention is drawn to the fact that, because of this rapid change when the animals are placed on good feed after a stunting period, it is not a good practice, as the animals lost forty-two days of gains before they started to increase in weight and produce profitably.

SOW-FEEDING EXPERIMENT.

As will be noted by referring to the annual report of the Central Experimental Farm for the year ending March 31, 1914, considerable work was carried on during that year along the lines of feeding tankage to in-pig sows to test its influence on the condition of the sow during pregnancy, the condition of the litters at birth, and the effect on the milk production of the sow during the first eight weeks after parturition. Owing to the fact that in the spring of 1914 some of the sows were late in farrowing, only a limited number could be reported on, thus detracting from the value of the experiment, and making necessary a repetition of the same.

This work was continued during the winter and spring of 1914-15, with a considerably larger number of sows than was used in the previous experiment, making the results that much more authoritative. In addition to, and combined with, the test of tankage, a test was made of a hopper grinder self-feeder, by means of which the sows were made to grind a part of their grain ration for themselves, incidentally securing some exercise while doing so. All the sows were housed in single-board hog-cabins situated in paddocks outside. This necessitated the exposing of the grinders to a certain extent, and as a consequence considerable difficulty was experienced in keeping them in running order; for, even when covered over, snow drifted in and

caused the mechanism to freeze up. Unless used in a close-covered shed they would hardly be practical for winter feeding of brood sows. On occasions when the grinders were out of order the sows were fed the corn whole in their troughs.

PLAN OF EXPERIMENT.

Six pens, five containing eight sows and one containing nine sows, were set aside for this work. These sows were graded to make all the lots as uniform as possible with regard to age, weight, general type, and breeding qualities. The experiment was carried on with three lots, each lot being duplicated, and the average of the two taken in calculating results. As some of the sows have not finished the eight-weeks period after farrowing at time of writing, all could not be reported on.

Lots 1 and 1A were fed the regular meal mixture, namely, equal parts by weight of bran, shorts, and finely cracked corn, fed as a thick slop.

Lots 2 and 2A were fed the regular meal mixture as lots 1 and 1A, with the exception that one-fifth by weight of this mixture was replaced by Swift's Digester Tankage. This ration was fed in the same way as that of the preceding lots.

Lots 3 and 3A were fed whole corn placed in the hopper grinder. In addition, they received, fed in the same manner as the preceding lots, the same number of pounds of shorts and of bran as they consumed of corn from the hopper grinder.

In addition to the above grain ration, all the sows received approximately the same amounts of water, roots, clover or alfalfa hay, and skim-milk, when available.

From November 27 to February 28 they received 3 pounds of meal mixture and 8 pounds of roots per sow per day. From March 1 to March 31 they received 5 pounds of meal and 2 pounds of roots per sow per day. From April 1 to end of experiment they received 6 pounds of meal per sow per day.

Samples of all meals were taken for chemical analysis, for the results of which the reader is referred to the report of the Dominion Chemist, Dr. F. T. Shutt.

VALUATION OF FOODSTUFFS.

The following valuations were placed on the meals and roughages consumed:—

Meal mixture (bran, shorts, and corn)	Per ton.	$ 23 00
Tankage (Swift's Digester)	"	50 00
Roots	"	2 00

Tables I, II, and III following, give the results of the experiment, while table IV gives a summary of the results of the two years' work.

TABLE I.—Lot 1. Brood Sow Feeding Experiment, Winter, 1914-15.

Breed.	Ear tag.	Date of service.	Date of farrowing.	Weight November 27, 1914	Weight before farrowing.	Weight of sows 4 weeks after farrowing.	Weight of sows 8 weeks after farrowing.	Number of pigs in litter.	Weight of litter.	Number in litter 4 weeks after farrowing.	Weight of litter 4 weeks after farrowing.	Number in litter 8 weeks after farrowing.	Weight of litter 8 weeks after farrowing.	Amount of meal consumed up to farrowing-time.	Amount of roots consumed up to farrowing-time.	Meal consumed 8 weeks after farrowing.	Roots consumed 8 weeks after farrowing.	Total cost of ration.	Days in experiment.	Ration.
				lb.	lb.	lb.	lb.		lb.	No.	lb.	No.	lb.	lb.	lb.	lb.	lb.	$ cts.	dys	Meal mixture
Yorkshire	222A	Oct. 17, '14	Feb. 7, '15	432	423	357	344	13, All good	33	10	122·5	9	246	216	576	230	230	5·93	128	Bran, shorts and corn, equal parts by weight, fed as a slop.
Yorkshire	153T	Nov. 9, '14	Mar. 4, '15	413	494	395	375	9, All good	27	6	99·5	6	156·5	299	752	309	54	7·80	153	
Yorkshire	246	Nov. 30, '14	Mar. 26, '15	475	595	500	470	14 { 8 good, 6 small	31·5	7	97·0	7	147·0	409	796	331	10	9·32	175	
Berkshire	304	Oct. 2, '14	Jan. 23, '15	328	395	308	282	10 { 9 good, 1 weak	25·5	7	76·0	7	132·5	171	456	208	328	5·14	113	
Yorkshire	309	Oct. 10, '14	Feb. 3, '15	385	423	353	319	11 { 10 good, 1 dead	26·0	9	131·0	9	236·0	204	544	230	262	5·80	124	
Yorkshire	322A	Oct. 29, '14	Feb. 19, '15	350	409	328	293	11 { 10 fair, 1 small	24·0	8	99·5	8	156·0	252	672	278	80	6·85	140	
Yorkshire	247A	Dec. 4, '14	Mar. 27, '15	360	462	370	342	13 { 9 good, 4 small	32·0	9	118·0	9	189·0	414	798	332	8	9·38	176	
Total				2743	3201	2611	2425	81	199	56	743·5	55	1263	1965	4594	1918	972	50·22	1009	
Average 7 head				392	457	373	346	11·6	28·4	8	106·2	7·9	180·4	281	656	274	139	7·17	144	

TABLE II.—Lot 2, Brood Sow Feeding Experiment, Winter, 1914-15.

Breed.	Ear tag.	Date of service.	Date of farrowing.	Weight November 27, 1914	Weight before farrowing.	Weight of sows 4 weeks after farrowing.	Weight of sows 8 weeks after farrowing.	Number of pigs in litter.	Weight of litter.	Number in litter 4 weeks after farrowing.	Weight of litter 4 weeks after farrowing.	Number in litter 8 weeks after farrowing.	Weight of litter 8 weeks after farrowing.	Amount of meal consumed up to farrowing-time.	Amount of roots consumed up to farrowing-time.	Meal consumed 8 weeks after farrowing.	Roots consumed 8 weeks after farrowing.	Total cost of ration.	Days in experiment.	Ration.
				lb.	lb.	lb.	lb.		lb.	Mo.	lb.	No.	lb.	lb.	lb.	lb.	lb.	$ cts.	dys	Meal mixture
Yorkshire	219	Dec. 4, '14	April 1, '15	455	519	515	475	7, All good	22·5	6	104·0	6	180	440	806	336	....	11·82	181	
Tamworth	199	Nov. 23, '14	Mar. 17, '15	488	567	514	495	11 { 7 good, 2 weak, 2 dead	26·5	7	84·0	5	116	364	778	322	28	10·54	166	
Yorkshire	221A	Sept. 17, '14	Jan. 9, '15	515	543	479	438	16 { 13 good, 3 small	42·0	8	111·5	8	238	129	344	180	412	5·14	99	
Yorkshire	202A	Oct. 16, '14	Feb. 7, '15	557	610	529	474	11 { 9 good, 1 small, 1 dead	25·0	7	93·0	7	205	216	576	242	230	7·31	128	Same meal mixture as lot 1, with one-fifth by weight replaced by tankage
Yorkshire	15	Oct. 14, '14	Feb. 5, '15	555	580	597	568	10 { 8 good, 2 small	19·5	4	63·5	4	142	210	560	236	246	7·14	126	
Yorkshire	223A	Oct. 7, '14	Jan. 28, '15	500	558	488	490	11, All good	26·0	5	67·0	4	122	186	504	218	298	6·54	118	
Tamworth	392	Nov. 4, '14	Feb. 24, '15	500	409	333	319	9, All good	24	9	155·0	9	249	267	712	293	94	8·75	145	
Tamworth	304	Oct. 20, '14	Feb. 9, '15	317	400	310	275	9 { 8 good, 1 small	27	8	135·0	8	237	222	592	248	214	7·38	130	
Tamworth	393	Nov. 23, '14	Mar. 17, '15	450	595	520	480	12 { 10 good, 2 small	28·5	11	144·0	9	213	364	778	322	28	10·55	166	
Total				4137	4781	4285	4014	96	241·0	65	957·0	60	1702	2398	5650	2397	1550	75·17	1259	
Average, 9 head				459	531	476	446	10·6	26·8	7·2	106·3	6·6	189	266	628	266	172	8·35	140	

TABLE III.—Lot 3, Brood Sow Feeding Experiment, Winter, 1914-15.

Breed.	Ear tag.	Date of service.	Date of farrowing.	Weight, November 27, 1914.	Weight before farrowing.	Weight of sows 4 weeks after farrowing.	Weight of sows 8 weeks after farrowing.	Number of pigs in litter.	Weight of litter.	Number in litter 4 weeks after farrowing.	Weight of litter 4 weeks after farrowing.	Number in litter 8 weeks after farrowing.	Weight of litter 8 weeks after farrowing.	Amount of meal consumed up to farrowing time.	Amount of roots consume d up to farrowing-time.	Meal consumed 8 weeks after farrowing.	Roots consumed 8 weeks after farrowing.	Total cost of ration.	Days in experiment.	Ration.
				lb.	lb.	lb.	lb.		lb.	No.	lb.	No.	lb.	lb.	lb.	lb.	lb.	$ cts.	dys	Meal mixture
Yorkshire..........	301	Dec. 15,'14	April 9, '15	410	540	410	370	14 {11 good.... 3 small...	40	10	127·5	6	182	488	806	336	....	10·28	189	Corn, shorts and bran, equal parts by weight. Shorts and bran fed as a slop. Corn fed whole in grinder.
Yorkshire..........	321A	Nov. 20, '14	Mar. 13, '15	345	437	378	375	12 {11 good..... 1 weak....	30·5	8	96·0	7	137	344	770	318	36	8·42	162	
Yorkshire..........	215A	Oct. 10, '14	Feb. 1, '15	530	600	480	415	12 {11 good.... 1 dead....	33·0	5	101·5	5	178	198	528	226	274	5·68	122	
Yorkshire.	234A	Oct. 7, '14	Jan. 30, '15	424	493	372	350	12 {9 good.... 3 dead....	34·5	8	130·5	8	244·5	192	512	222	286	5·55	120	
Yorkshire..........	330A	Oct. 8, '14	Jan. 28, '15	445	493	391	375	14 {9 good.... 5 weak....	27·5	3	47	3	99·0	186	496	218	298	5·44	118	
Berkshire..........	207	Dec. 21, '14	April 14, '15	365	492	362	332	10, All good...	24·5	10	133	10	225·0	518	806	336	....	10·63	194	
Berkshire..........	107	Dec. 5, '14	Mar. 31,'15	320	355	305	250	10 {9 good.... 1 small...	28·0	9	120	9	204·0	434	806	336	....	9·66	180	
Berkshire..........	339	Nov. 30,'14	Mar. 26, '15	262	322	300	270	9 {6 good.... 2 small... 1 dead....	20·0	6	82	6	143·0	409	796	331	10	9·31	175	
Total............	....	....	....	3101	3732	2998	2737	93	238·0	59	837·5	54	1412·5	2769	5520	2323	904	64·97	1260	
Average, 8 head.....	....	....	....	387	466	375	342	11·6	29·7	7·4	104·7	6·7	176·5	346	690	290	113	8·12	1575	

TABLE IV.—Summary of Results, Brood Sow Feeding Experiment—Winters, 1913-4. and 1914-15.

Lot.	Ration.	Average amount of meal consumed per sow.	Average cost of feed per animal per day.	Number of days in experiment.	Average gain in weight per sow from Nov. 27 to just before farrowing.	Average loss in weight per sow in first 4 weeks after farrowing.	Average loss in weight second 4 weeks after farrowing.	Average Weight of Pigs in Litter. At birth.	At 4 weeks.	At 8 weeks.	Condition of Litter at Birth. Good.	Small weak or dead.
		lb.	cts.	lb.	lb	lb.	lb.	lb,	lb.	lb.	p.c.	p.c.
1914–15, Lot 1....	Corn, shorts and bran, equal parts..............	555	4·95	144	65	84	27	2·45	13·27	22·96	83·9	16·0
1914–15, Lot 2.....	Above mixture plus one-fifth tankage............	532	5·96	140	72	55	30	2·51	14·72	28·36	85·4	14·5
1914–15, Lot 3....	Corn, shorts and bran. Corn in grinders.........	636	5·15	157·5	79	91	33	2·55	14·19	26·15	81·7	18·2
1913–14, Pen 1....	Bran, shorts..............	980	6·18	176	72	92·4	31·2	2·44	11·4	19·66	85·1	14·8
1913–14, Pen 2....	Above mixture plus one-third tankage...........	883	8·63	163	60	84·2	41·6	2·42	13·5	25·2	91·8	8·1

DATA FROM EXPERIMENTS.

The results of this experiment, coupled with those of the experiment carried on in the winter of 1913-14, permit of more definite conclusions being drawn than heretofore. At the same time it must be pointed out that these results do not show any decided advantage in favour of one ration over another. However, some interesting facts may be pointed out and summarized as follows:—

1. The amount and cost of food per sow per day does not vary to any extent within the five lots, except where tankage enters into the ration, in which case the cost is higher, the increase being proportionate to the amount of tankage used.

2. The gain in weight of the sows before farrowing and loss during the eight weeks immediately after farrowing are fairly constant, with the smallest loss after farrowing in favour of the tankage ration in the 1914-15 experiment.

3. The condition of the young pigs at birth, as indicated in the last two columns of table IV, is rather significant, for here again the advantage is in favour of the tankage ration in both instances.

4. The average weight of pigs at birth is practically equal in all lots, while the weights at 4 weeks and 8 weeks of age show a slight increase in gain in each case in favour of the tankage ration.

5. A comparison of lot 1, the check lot, with lot 3, where the grinder was used, to grind the corn for the sows, shows a slight advantage in weight in the litters at all stages of growth, but the difference is hardly sufficient to warrant putting much stress on it. If the cost of grinding the corn were deducted from the cost of feed the balance would be slightly more in favour of lot 3, but this would be offset again by the trouble experienced in operating the machines, consequently the hopper grinder may be considered as of no value in the out-door winter feeding of brood sows.

FINANCIAL STATEMENT FOR SWINE.

Below are submitted inventories and returns for swine on the Central Experimental Farm for the year April 1, 1914, to March 31, 1915.

	April 1, 1914.		March 31, 1915.		Returns, including Sales.	Gross Returns, including Sales and increased Values.
	No.	Value.	No.	Value.		
		$ cts.		$ cts.	$ cts.	$ cts.
Swine, all breeds and ages......	217	4,563 00	220	4,854 00	1,870 78	2,963 28

Returns.

By Increased value....................	$ 291 00	
Sales of breeding stock....................	892 50	
Sales of feeding stock....................	1,549 78	
Boar service fees....................	30 00	
Manure, 200 tons at $1....................	200 00	
Gross returns....................		$ 2,963 28

Expenditures.

To Foods consumed....................	$ 1,664 65	
Purchase of breeders....................	292 00	
Labour expended....................	950 00	
Gross expenditures....................		$ 2,906 65
Net balance from swine....................		$ 56 63

Ottawa.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

BREEDING SWINE.

There are at present eighteen pure-bred breeding pigs at this Farm. Two breeds only are kept, namely, Berkshire and Yorkshire.

Of Berkshires there are three aged sows, three young sows, one aged boar, one 8-months-old boar, and four young boars.

Of Yorkshires there are five aged sows and one aged boar.

All breeding pigs are in excellent condition and are giving very satisfactory returns. Four sows have farrowed to date, three Yorkshires and one Berkshire, yielding thirty-two young pigs, or an average of eight per litter.

During the greater part of the winter, all young breeding sows and boars were housed outside in hog cabins. (See accompanying photo.) They came through the winter in excellent shape; in fact, they did very much better than those kept inside, which goes to show that plenty of fresh air and exercise is most beneficial to young growing pigs.

The following is the method of feeding and the foodstuffs consumed by pigs of different ages:—

From April 1 to July 1, 1914, the ten aged pigs received 4 pounds shorts and 6 pounds skim-milk per head per day.

From July 1 to November 1, 1914, they received 4 pounds shorts, 4 pounds skim-milk, and 5 pounds green feed per head per day.

From November 1, 1914, to February 13, 1915, they received 4½ pounds shorts, half pound cracked corn, 2 pounds skim-milk, and 2½ pounds pulped roots per head per day.

From February 13, 1915, to March 31, 1915, they received 4½ pounds shorts, half pound cracked corn, 4 pounds skim-milk, and 2½ pounds pulped roots per head per day.

The eight young pigs received, from December 1, 1914, to January 9, 1915, 2 pounds shorts, 3 pounds skim-milk, and 2½ pounds pulped roots.

From January 9, 1915, to March 31, 1915, they received 2 pounds shorts, half pound cracked corn, 3 pounds skim-milk, and 2½ pounds pulped roots.

From February 20 to March 31, 1915, they received half pound molasses.

The following table gives the total amount of each and the cost of feed. The value of foodstuffs was: Shorts, $30 per ton; cracked corn, $38 per ton; green feed, $2 per ton; skim-milk, 20 cents per hundredweight; and molasses, 20 cents per gallon.

Aged pigs.	Period.	Shorts.	Cracked corn.	Skim-milk.	Roots	Green feed.	Molasses.	Cost of feed.	
No.								$ cts.	$ cts.
10	April 1, 1914, to July 1, 1914	3,640	....	546	......	......	......	55 69	......
10	July 1, 1914, to Nov. 1, 1914	4,920	....	4,920	......	6,150	......	89 79	......
10	Nov. 1, 1914, to Feb. 13, 1915	4,745	545	2,100	2,630	......	......	88 36	......
10	Feb. 13, 1915, to March 31, 1915	2,070	230	1,840	2,630	......	......	41 73	275 57
Young breeding pigs.									
8	Dec. 1, 1914, to Jan. 9, 1915	640	....	960	960	......	......	12 48	......
8	Jan. 9, 1915, to March 31, 1915	1,296	324	1,944	1,624	......	......	31 10	......
8	Feb. 20, 1915, to March 31, 1915	....	....	......	......	......	324	4 80	48 38
18	365 days	17,311	1,099	12,310	7,844	6,150	324	......	323 95
Feeding pigs.									
4	212 days	1,776	324	636	378	......	......	......	34·45
									358·40

NAPPAN.

FINANCIAL STATEMENT FOR SWINE.

Breeds.	April 1, 1914.		April 1, 1915.		Returns, including sales.	Gross returns, made up of increased value and sales.
	No.	Value.	No.	Value.		
		$		$	$	$
Yorkshires and Berkshires (all ages)......................	11	300 00	54	618 00	271 00	589 00

Returns.

Increase in value..	$ 318 00	
Sales during the year..	243 00	
Value of manure..	15 00	
Services..	13 00	
		$ 589 00

Expenditures.

Cost of feed and bedding..	$ 398 40	
Cost of labour..	164 25	
Cost of new stock..	25 00	
		$ 587 65
Net balance..		$ 1 35

NOTE.—There were four pigs which could not be classed as breeders, as they went off their feed and it took them some time to get back again. Hence they only brought half as much for pork as they otherwise might have. Then, too, the cost of feeding the matured sows is higher than it should be, due to the lack of pasturing facilities during the summer months. Again, the prices of feed were very high throughout the heaviest feeding period.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

REPORT OF THE SUPERINTENDENT, JOS. BEGIN.

SWINE.

The Yorkshire herd at this Station numbers sixteen head, made up of two breeding sows and one good boar, three yearling sows and a litter of pigs farrowed last winter.

There being no suitable accommodation for facilitating experimental work in the feeding and care of swine, temporary quarters were made in an old barn, pending the construction of the proposed piggery. The basis of feed was second-cut clover hay, wheat bran, and shorts. In the summer and autumn the swede turnips and pasture, together with a very small amount of grain, kept these animals in splendid shape.

The feed was given out-of-doors all winter, in order to force the sows to get the exercise so necessary to all these animals, and particularly to breeding sows. Sods taken in during the fall were also given them regularly, in the yard.

The following head of Yorkshires have been sold for breeding purposes during the year:—

One registered boar	$ 18 00
One registered sow	20 00

EXPERIMENTAL STATION, CAP ROUGE, QUE.

REPORT OF THE SUPERINTENDENT, GUS. A. LANGELIER.

SWINE.

There is only one Yorkshire sow on the Farm, and she will soon be sent to the Ste. Anne Station, as the piggery is to be transformed into a sheep barn. No hogs will be kept until proper accommodation is available.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

SWINE.

There are thirty-six swine on this Farm on March 31, 1915. They consist of the following: Berkshire: five brood sows, one boar, and ten young pigs; Yorkshire: six brood sows, one boar, and thirteen young pigs.

The best of the surplus pure-bred offspring are sold for breeding purposes to farmers. Most of them are sold at weaning, and at that age they are usually valued at $8. This permits a farmer to obtain a start in pure-bred swine at low cost. As they get older, higher prices are charged. As only one boar of each breed is kept, it is often necessary to cross-breed in order to avoid in-breeding. The cross-bred offspring are used for pork production and for experimental feeding. Some of the less desirable pure-breds are used in the same way.

COST OF FEEDING A BROOD SOW.

Records have been kept of the feed given to various animals, in order to get data on the cost of production. The amount of feed consumed by one sow from April 1, 1914, to March 31, 1915, is presented herewith. The sows were not pastured at all last year, and the grain fed is all charged at average rates for grain of good quality. The cost of keeping a sow could be lowered somewhat by the use of pasture and screenings or other low-grade grain.

Feed used by Brandon Claribelle, Yorkshire Sow, April 1, 1914, to March 31, 1915.

943 pounds of oat chop at $20 per ton	$ 9 43
363 pounds of shorts at $22 per ton	3 99
215 pounds of feed flour at $30 per ton	3 22
78 pounds of bran at $20 per ton	78
Total	$ 17 42

This sow raised a litter of eight pigs, and the food which they ate up to weaning time, at 7 weeks of age, is included in the mother's feed.

PIG-FEEDING EXPERIMENT.

Barley is generally accepted as the standard food for pig fattening, but differences of opinion exist as to what other feeds are best to use with barley. Oats are used to quite an extent for this purpose, but, especially in a year like this, when oats are very dear, the profit to be obtained would seem to be very uncertain. In order to test whether or not mill feeds such as flour and shorts would give more economical results, this experiment was tried:—

Four different rations were used, which were fed to four lots of five pigs each. Lot 1 received barley chop; lot 2, barley chop and feed flour in the proportion of three parts of barley chop to one part of feed flour; lot 3, barley chop and shorts, three to one; and lot 4, barley chop and oat chop, one to one. These feeds were put into the trough dry and luke-warm water poured onto them. The hogs were fed twice a day, and were

started on 3 pounds per pig per day. This amount was gradually increased until by February 17, they were receiving 7 pounds per day, which rate was continued until the end of the experiment.

The pigs used in the experiment were a uniform lot, such as may be found on the average farm in the fall. They were Yorkshire and Berkshire grades and crosses. The twenty pigs were divided into four as equal lots as possible. They were purchased from a farmer at Minto, and arrived at Brandon on November 10. They were all fed on the same rations from November 10 to November 25, which was the day the experiment started. The feed used prior to starting them on the experiment was composed of three parts of oat chop, one part of feed flour, and one part of shorts. This feed is also charged up to the pigs, and appears in the following table. From November 28 to February 20, each pig received 1 pound of Digester tankage per day. They also received a limited amount of charcoal at different intervals. They were housed in dry, warm pens, and were perfectly healthy throughout the entire experiment. The pigs were sold to one of the local butchers for 6½ cents per pound.

The following tables show: first, the gains made by each pig during each month of the experiment, and secondly, a summary of the whole experiment, showing comparative results in gains, profits, cost of production, etc., of the four lots.

MONTHLY GAINS IN WEIGHT.

LOT 1.—Fed Barley Chop.

Pig.	Weight. Nov. 17.	Weight. Dec. 24.	Weight. Jan. 21.	Weight. Feb. 18.	Weight. Mar. 4.	Gain in 3½ months.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 020	97	138	185	235	265	68
No. 804	85	127	171	215	243	158
No. 105	80	110	149	190	224	144
No. 97	70	81	120	150	175	105
No. 002	68	105	150	203	226	158
Total	400	561	775	993	1,133	733
Average per pig	80	112·2	155	198·6	226·6	146·6

LOT 2.—Fed Barley Chop and Feed Flour.

Pig.	Weight. Nov. 17.	Weight. Dec. 24.	Weight. Jan. 21.	Weight. Feb. 18.	Weight. Mar. 4.	Gain in 3½ months.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 807	100	155	200	245	280	180
No. 010	76	106	149	210	228	152
No. 82	82	125	162	210	248	166
No. 018	75	131	158	215	240	165
No. 112	66	95	127	185	200	134
Total	399	612	796	1,065	1,196	797
Average per pig	79·8	122·4	159·2	213	239·2	159·4

BRANDON.

LOT 3.—Fed Barley Chop and Shorts.

Pig.	Weight. Nov. 17.	Weight. Dec. 24.	Weight. Jan. 21.	Weight. Feb. 18.	Weight. Mar. 4.	Gain in 3½ months.
	Lb.	Lb.	Lb	Lb.	Lb.	Lb.
No. 116	95	135	177	230	260	165
No. 021	87	117	159	200	235	148
No. 024	80	113	155	195	210	130
No. 016	70	105	137	185	202	132
No. 006	65	83	130	165	195	130
Total	397	553	758	975	1,102	705
Average per pig	79·4	110·6	151·6	195	220·4	141

LOT 4.—Fed Barley Chop and Oat Chop.

Pig.	Weight. Nov. 17.	Weight. Dec. 24.	Weight. Jan. 21.	Weight. Feb. 18.	Weight. Mar. 4.	Gain in 3½ months.
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 012	91	128	171	213	240	149
No. 005	89	125	163	205	230	141
No 023	83	117	155	193	215	132
No. 025	70	104	145	185	200	130
No. 806	65	83	130	165	175	110
Total	398	557	764	961	1,060	662
Average per pig	79·6	111·4	152·8	192·2	212	132·

BRANDON.

SUMMARY OF RESULTS.

Feed.	Lot 1. Fed Barley Chop.	Lot 2. Fed Barley chop and Feed Flour, 3 to 1.	Lot 3. Fed Barley chop and Shorts 3 to 1.	Lot 4. Fed Barley chop and Oat Chop. 1 to 1.
Number of pigs in lot	5	5	5	5
First weight, gross, November 17, 1914 ... lb.	400	399	397	398
First weight, average	80	79·8	79·4	79·6
Finished weight, gross, March 4, 1915 ... "	1,135	1,196	1,102	1,060.
Finished weight, average ... "	227·0	239·2	220·4	212
Total gain in 107 days ... "	735	797	705	662
Average gain per pig ... "	147·0	159·4	141	132·4
Average daily gain per pig ... "	1·37	1·48	1·32	1·24
First cost of pigs (including freight) at $4.13 each ... $	20·65	20·65	20·65	20·65
Total cost of feed ... $	35·24¾	36·76¾	34·33¾	37·27
Total cost ... $	55·89¾	57·41¾	54·98¾	57·92
Receipts from sale at 6½ cts. per pound ... $	73·64½	77·74	71·63	68·90
Profit ... $	17·74¾	20·32¼	16·64¼	10·98
Average cost per pig ... $	4·13	4·13	4·13	4·13
Average cost of feed per pig ... $	7·05	7·35	6·87	7·45
Average selling price per pig ... $	14·73	15·55	14·33	13·78
Average profit per pig ... $	3·55	4·07	3·33	2·20
Average cost of 100 pounds gain ... $	4·79	4·61	4·87	5·63
Amounts of feed used:—				
Oats at 50 cents. per bushel ... lb.	135	135	135	1,352
Barley at 60 cents. per bushel ... "	2,433	1,825	1,825	1,216
Shorts at $22 per ton ... "	45	45	653	45
Feed flour at $30 per ton ... "	45	653	45	45
Tankage at $40 per ton ... "	84	84	84	84

The following points may be drawn from this experiment:—

(1) Barley chop is a good feed for fattening hogs, as all the hogs in the experiment made good gains.

(2) Oat chop and barley chop gave the poorest gains and the costliest gains. Oat chop is not as good a feed for fattening hogs as the other combinations under test, and at present prices, costs too much.

(3) The addition of feed flour to the barley chop, even though it made a more expensive feed, increased the gains in weight and made the cost of production lower.

(4) Shorts did not give as good results as feed flour for mixing with barley; in fact, the barley alone in this test did slightly better than barley and shorts.

(5) Even with hogs at 6½ cents per pound, and grain at the high prices charged in this experiment, good wages and some profit besides were made in feeding these hogs.

BRANDON.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT, K. MacBEAN, B.S.A.

SWINE.

In the herd of swine at present on the Indian Head Experimental Farm, there are two boars and four sows of the Yorkshire breed, with one boar and four sows representing the Berkshire breed.

During the year, only two Yorkshire boars and one Berkshire boar were sold to farmers for breeding purposes. There was a greater demand for boars than the Farm could supply, but there was no demand for sows.

Due to lack of accommodation, it was necessary to sell a number of the young sows to the butcher, only eight of the best being kept for breeding purposes.

All the sows have been wintered in outside cabins, and results prove that such is a very desirable method of wintering brood sows.

There is room for much important work with swine at this Farm, and, when the equipment is available, hopes are entertained for considerable development in this branch of the animal husbandry work.

EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE SUPERINTENDENT, G. H. HUTTON, B.S.A.

SWINE.

The hogs owned by this Station on March 31, number thirty-nine, composed of the following: 1 Yorkshire boar, 7 Yorkshire sows, 2 Berkshire boars, 6 Berkshire sows, 10 young Berkshire pigs, 13 barrows and sows.

A number of feeding experiments have been carried on during the year, and the reports on these trials are submitted herewith. The Station is as yet without a regular pig pen, but the use of hog cabins has been so satisfactory that the lack of a pig pen was not felt very seriously, though such a building would facilitate experimental feeding to some extent.

The Yorkshire boar at the head of the herd is developing into an animal of splendid size, with ample bone, remarkable back and depth of side. He weighs 800 pounds in fair breeding condition, and is leaving pigs of splendid vigour, that develop rapidly.

PIG-FEEDING EXPERIMENTS.

RATION FOR PIGS AFTER WEANING.

Three groups of pigs were fed three distinct rations with the object of determining the best feed for young pigs just after being weaned. The following table gives the results.

Three groups of hogs were fed as follows:—

Group 1.—Six hogs, 10 weeks old; fed barley and skim-milk.

Group 2.—Five hogs, 9 weeks old; fed shorts and water.

Group 3.—Five hogs, 9 weeks old; fed shorts and skim-milk.

——		Group 1. Barley and skim-milk.	Group 2. Shorts and water.	Group 3. Shorts and skim-milk.
Weight at commencement	lb.	370·	269	198·
Average weight at commencement	"	61·6	53·8	39·6
Weight at finish	"	445	350	318
Average weight at finish	"	74·1	70·	63·6
Total gain	"	75·0	81·	120·
Average gain	"	12·5	16·2	24·
Average daily gain	"	·52	·67	1·
Cost of grain at 1 cent per pound	$	3·92	3·86	3·30
Cost of skim-milk	$	·52	....	·45
Cost per 100 pounds gain	$	5·92	4·76	3·12

VALUE OF FROSTED WHEAT.

Two groups of hogs were fed as follows:—

Group 1.—Consisting of seven hogs; were fed well ground, slightly frosted wheat and water.

Group 2.—Consisting of ten hogs; were fed oats, barley well ground, and skim-milk, in proportion of one part of oats to two parts of barley and enough skim-milk to make a rather thick slop.

—		Group 1. Frosted wheat and water.	Group 2. Oats, barley and skim-milk.
Weight at commencement	lb.	580·	730·
Average weight at commencement	"	83·	73·
Total weight at finish	"	810·	970·
Average weight at finish	"	116·	97·
Total gain	"	230·	240·
Average gain	"	32·85	24·
Average daily gain	"	1·37	1·
Cost of grain at 1 cent per pound	$	7·50	10·60
Cost of skim-milk	$	....	5·03
Cost per pound gain	$	3·26	6·51

In a second trial to determine the value of frosted wheat, the average cost of 1 pound of gain was 5·14 cents, while the average cost for a period of sixty-seven days was 4·2 cents per pound. When pork is worth 6 cents per pound, gains in live weight of hogs made on the above basis would give to frosted wheat a value of $1.33 per hundred pounds. Still another trial gave results as follows:—

Two groups of hogs, consisting of five each, were fed as follows:—

Group 1.—Well-ground frozen wheat and water.

Group 2.—Well ground oats and barley and water, grain in proportion of one part of oats to two parts of barley.

—		Group 1. Frozen Wheat.	Group 2. Oats and Barley.
Weight at commencement	lb.	666	680
Average weight at commencement	"	133·2	136·
Total weight at finish	"	1,060·	1,030·
Average weight at finish	"	212·	206·
Total gain	"	394·	350·
Average gain	"	78·8	70·
Average daily gain	"	1·83	1·62
Cost of grain at 1 cent per pound	$	16·25	16·90
Cost per 100 pounds gain	$	4·12	4·82

COST OF KEEPING SIX SOWS FOR ONE YEAR.

One Berkshire and five Yorkshire sows have been carried for the full year. The cost of feed for the period has been as follows:—

Five months on pasture at 50 cents per sow per month	$ 15 00
Seven months on grain, total consumed 5,600 pounds at 1 cent per pound	56 00
1,200 pounds of skim-milk per sow, at 20 cents per hundred pounds	14 40
	$ 85 40
Average cost per sow	$ 14 23

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COST OF PRODUCING PORK.

The following figures have been secured while finishing five groups of pigs for market, and represent the cost of carrying these pigs from the time they were weaned until they were sold:—

No. of pigs.	Average age when sold.	Average weight when sold.	Average price when sold per cwt.	Average cost per pound to produce.	Average profit per pound.
	Days.	Lb.	$ cts.	cts.	cts.
36	190	189·83	6 42	3·54	2·88

Allowing that one litter per year represents the work to be expected of each sow, and deducting the cost of maintaining the sows producing the above litters for the year during which the pigs were farrowed, from the profit on the production of the pork, a net profit of $111.45, or a profit per sow of $22.28, is shown.

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EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE SUPERINTENDENT, P. H. MOORE, B.S.A.

BREEDING WORK WITH HOGS.

The breeding herd of Yorkshire swine has been increased considerably in the course of the year. There are now two stock boars, twenty-five sows of breeding age, and six younger sows, making a total of thirty-three head in the breeding herd. Besides this increase, quite a number of sales have been made of breeding stock, for which the demand was good, particularly in the earlier part of the year.

In the breeding work, particular attention has been paid to selection for quality, size, and uniformity. Continuing the practice of last year, all breeding stock has been kept in cots and allowed as much range as possible. This method of housing has proved very economical and, in a climate such as obtains here, we consider it the most satisfactory method of housing breeding stock.

Late in the autumn of 1914, all the breeding stock was moved to a bush field on the north side of the farm, where they were allowed to run during winter. There was a quantity of fern in the bush, and from digging this the pigs secured their own green food. This, coupled with a judicious amount of grain, gave us sows in good condition in the spring, which produced strong healthy litters.

A short trial was made on feeding clover silage to brood sows, and although we have not yet sufficient figures to publish, the results appeared very good. When the sows were all in good condition, and pregnant, they were given as much clover silage as they would eat, together with one-third of their usual grain ration, and were allowed free access to water. The sows appeared to enjoy this ration, and continued to put on flesh till farrowing time.

The following summary gives the performance of the fifteen sows which had litters during the year. These sows ranged in age from 1 year to 7 years.

SUMMARY of Breeding Work—Summer and Winter Litters.

Year, 1914–15.	Number of sows.	Number of litters.	Number of pigs farrowed.	Average number farrowed per litter.	Number of pigs raised.	Average number raised per litter.	Per cent raised.
Summer litters	....	9	82	9·11	72	8·00	87·80
Winter litters..	....	12	127	10·58	100	8·33	78·84
Total......	15	21	209	9·95	172	8·2	82·3

PERFORMANCES of the Individual Sows.

Number of Sow.	Age.	Summer Litter.		Winter Litter.	
	Years.	Number farrowed.	Number raised.	Number farrowed.	Number raised.
2	7	....	....	15	7
3	5	....	....	13	9
6	1·5	7	6	....	....
7	1·5	6	6	....	
8	1·3	7	6	7	7
9	1·6	10	8	11	9
10	3	12	10	10	3
11	3	7	7	8	8
12	2·35	8	7	....	
13	2·35	14	12	13	13
17	2	11	10	8	8
19	2	Premature birth.		12	11
23	1·2	....	....	10	9
31	1	....	....	10	8
32	1	....	....	10	8
Totals	....	82	72	127	100

This we consider a very ordinary performance. There was probably more loss in the winter litters, caused by moving the sows to a very rough shed in the bush, and having them farrow in a strange place. In spite of this the number of pigs raised in proportion to the number farrowed is 6·2 per cent higher this year than last.

Below are given our records of the cost of keep for one year of an aged boar, and the cost of raising one young boar from 7 to 13 months of age.

Aged Boar: Cost for One Year.

Ration—	
Green food (mangels, etc.)—1,918 pounds at ·15 cent	$2 87
Shorts—1,384 pounds at 1⅓ cent	17 99
Chop—205 pounds at 1·0 cent	2 05
Oil meal—59 pounds at 1·75 cent	1 03
Total cost	$23 94

Young Boar: Cost from 7 to 13 Months During Winter.

Ration—	
Green food (mangels, etc.)—684 pounds at ·15 cent	$ 1 02
Shorts—810 pounds at 1·3 cent	10 53
Chop—181 pounds at 1·0 cent	1 81
Oil meal—33 pounds at 1·75 cent	58
Skim milk—605 pounds at ·25 cent	1 51
Total cost	$15 45

In the case of the aged boar, the ration supplied did not make him fat but kept him in excellent breeding condition; but with respect to the young boar, he put on flesh and made splendid growth, showing plenty of bone of good quality. Both pigs were kept in cots and allowed to run in yards, from which they could obtain only a very limited amount of green food.

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We also give some figures collected on the cost of keeping brood sows and raising young pigs. The figures given were obtained from the records of sows ranging from 1 to 7 years of age; in the case of the litters produced, they were obtained from the fall and winter feeding of the sows.

Average of Five Sows; 1 to 7 years old, autumn and winter keep From time of weaning to farrowing spring litter, 134 days.

Ration—	
Wheat shorts—580 pounds at 1·3 cent	$7 53
Chop—29 pounds at 1·0 cent	29
Oil meal—43 pounds at 1·75 cent	75
Total	$8 57

From time of farrowing to weaning—60 days (including food for young pigs).

Ration—	
Wheat shorts—615 pounds at 1·3 cent	$7 99
Oil meal—3·5 pounds at 1·75 cent	6
Skim-milk—530 pounds at ·25 cent	1 32
Mangels—355 pounds at ·15 cent	53
Total	$9 90
Total cost of food for sow and litter	$18 47
Average number of pigs farrowed	11·2
" weight of pigs farrowed ..lb.	2·37
" number of pigs raised	8·02
" cost per pig raised	$2 32

Cost of raising the young sows from weaning to 6 months of age—120 days. (Average of five young pigs.)

Ration—	
Shorts and chop (mixed)—480 pounds at 1·15 cent	$5 52
Skim-milk—240 pounds at ·25 cent	60
Green food (pasture approximate, $1)	1 00
Total	$7 12

Cost of raising the young sows from 6 months to 1 year of age. (Average of five young pigs.)

Ration—	
Shorts and chop (mixed), 586 pounds at 1.15 cent	$6 74
Skim-milk—380 pounds at ·25 cent	95
Green food—740 pounds at ·15 cent	1 11
Oil meal—39·5 pounds at 1·75 cent	69
Total	$9 49
Cost of raising young brood sows to 1-year old	$18 93

EXPERIMENTAL WORK WITH SWINE.

In our annual report for 1913-14, we published the results of some fairly extensive feeding trials with hogs. In these trials rice meal was tested against other foods, and was found to be unprofitable when fed in any quantity.

It was not only unprofitable but also injurious, producing a diseased condition, the symptoms of which, as was stated, resembled those of beri-beri in the human subject. We are aware that this last point is one for the pathologist rather than the agricul-

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turist; yet we mention this resemblance because it seems to throw light on our problem. In other words, it has given us a suggestion for the year's work, which we hope will be justified by its results.

It must be remembered that in last year's work, rice meal formed the whole or half the grain ration, but was always fed in combination with roots, skim-milk, dried blood, or such foods. This year rice meal was fed as a complete ration in some cases, but always with the complementary green foods, etc. When fed in mixtures the rice meal constituted one-third of the grain ration, as opposed to one-half in last year's experiment. In spite of the decreased proportion of the meal, the disease occurred in every case where no corrective was used, though the symptoms naturally took longer to appear.

With the various theories as to the cause of beri-beri, we have nothing to do. It will be sufficient to mention that some authors consider that the disease is caused by the lack of some digestive ferment in polished rice; others by a poison in the rice; and others again by the lack of some necessary ingredient, notably phosphorus, in the rice diet. This last theory seems to fit our case.

Reference must be made here to the experiments of Hart, McCollum, and Fuller[1]; which have a direct bearing upon our work. These investigators fed pigs certain forms of inorganic phosphorus, in an attempt to prove that inorganic phosphorus could be assimilated by animals, to supplement a ration extremely low in phosphorus content. As controls, they used a normal ration for fattening hogs. The results are definite. They found that animals fed a low phosphorus ration, supplemented by different forms of inorganic phosphorus, made as vigorous a development as others fed a normal ration. On the other hand, those receiving the same ration, without the addition of inorganic phosphorus, made no gains after a certain point, and eventually showed a diseased condition.

The symptoms described very strongly resemble those observed in pigs fed upon rice meal. We quote from the Wisconsin publication:

> "By January 17 one of the animals showed stiffness of the hind-legs and a partial loss of their control. A few days later the other animals of the same lot manifested similar symptoms . . . . . . By the end of January, it became necessary to assist the animals to their feeding troughs. They continued to lie in a dormant, stupefied condition a large share of the time. When standing, the hind limbs assumed an oblique position, the hind feet resting far beneath the body, and near the forefeet."

Elsewhere reference is made to the weakness of the limbs, twitching tendency of the muscles, dragging the hind-quarters, and the peculiar attitude when standing. These symptoms were reproduced exactly in the case of our rice meal fed pigs. In every case the animals showed symptoms more or less acute, in proportion to the length of the period and the amount of meal consumed: Lameness, particularly of the hind-legs, and the peculiar "humped up" attitude when standing, which is very typical; gradual loss of appetite, nervousness, and finally practical paralysis. All these are described in our last report (pp. 462-474, plates xlix and lii).

It is important to note that these symptoms in the pigs were not always accompanied by a corresponding decrease in weight. Also it was found that, except in advanced cases, the condition of the internal organs was practically normal from a feeder's standpoint. Dr. Hadwen, in his examination of the diseased pigs (p. 474 Annual Report, 1913-14), says: "The pathological changes seen in the pigs fed one hundred days were, as a rule, insignificant."

It was, in fact, one of the surprises of the investigation that pigs, so obviously badly affected externally, should show, to the layman at any rate, comparatively few internal lesions. One lesion, however, was marked, and that was the softness of the bones. In this connection we must refer again to the findings of Hart, McCollum, and

[1] Annual Report, Agri. Exp. Station, Wisconsin, Univ., 1908-9, Research Bull. 1.

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Fuller, already mentioned. In their chemical analyses they found that the internal organs of phosphorus starved pigs showed a normal amount of phosphorus, but that the bones were very deficient. For the sake of clearness we quote a few figures from their bulletin.

—	Lot 1. Phosphorus starved.	Lot 2. Standard ration.
Per cent phosphorus in blood	·24	·28
Per cent phosphorus in leg muscle	·93	·78
Per cent phosphorus in liver	1·43	1·27
Breaking strength of thigh	·63	1·69
Ash content, per cent	31·	46·

From these it will be seen that phosphorus-starved pigs showed a normal amount of phosphorus in the soft parts of the body, but that it was in the bones that the deficiency became apparent. From which they conclude that the animals are able to draw this element from the skeleton for the use of the body.

These facts seem to have a direct bearing on our results with rice meal. As stated above, the internal organs of the diseased pigs were normal except where extreme debility had set in. The pigs continued to make gains in some cases, after the lameness and other symptoms had appeared. The bones, however, were invariably soft and spongy. They could be bent with ease or cut through with an ordinary butcher-knife. In some cases even the skull bones could be cut into with comparative ease. This condition would appear to indicate that the pigs, deprived of their normal amount of phosphorus, were drawing this element from the bones for the up-keep of the body.

With regard to the distribution of phosphorus in the growing pig, we are fortunate in being able to refer to the recent work of Williams and Emmett[1]. In a very complete series of analyses they find the percentage increase of phosphorus in the various parts of the bodies of growing pigs to be as follows:—

Increase of body weight . . . . pounds.	51 to 195
Per cent increase of phosphorus in entire body	329·9
Per cent increase of phosphorus in skeleton	457·7
Per cent increase of phosphorus in meat	107·0
Per cent increase of phosphorus in offal and blood	61·0

The experiments extend over a period of twenty-seven weeks, the pigs being 18 weeks old at the commencement, and 43 weeks at the end of the period. The distribution of phosphorus in the various parts of the body showed a very marked change during growth. The phosphorus in the boneless parts decreased about one-half in proportion to body weight; while that in the skeleton increased about one-half.

[1] Bull. No. 171, Univ. of Illinois, Agric. Exp. Station, June, 1914.

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PHOSHORUS per 100 pounds live weight.

	YOUNG PIG.	OLD PIG.
	Grams.	Grams.
Skeleton	176·66	262·66
Boneless meat	64·57	35·58
Offal and blood	30·98	13·26

From the feeder's standpoint these figures are valuable, since they emphasize the importance of phosphorus in building up the framework of the young growing hog, and the consequent injury which might be caused by a diet (such as rice meal) which is apparently deficient in this element.

The application of these facts to our problem is not far to seek. The symptoms in our pigs fed on rice meal are apparently those of phosphorus starvation. The lameness and nervousness, condition of bones, comparative lack of internal lesions, all point in this direction. That a lack of phosphorus in the ration could produce such injurious results is not to be doubted, when we consider the age of the pigs, and the necessity of phosphorus for the proper growth of the young animal.

As an illustration we give here the protocols of three trials. These properly belong to last year's work, but were not complete at the time of publication.

In all, six lots were used, four pigs in each lot. These can be grouped as follows:—

In lots 15 and 16, where rice meal was fed in equal quantities with chop, both lots getting the same quantity of green food, lot 15 received dried blood, and lot 16 skim-milk. Both lots became so badly diseased that they were condemned. However, lot 15 made an average daily gain of ·07 pound, while lot 16 lost ·002 pound per day.

SUMMARY—Lots 15 and 16.

		Lot 15.	Lot 16.
		Pen 29.	Pen 27.
Ration.		Rice meal, Chop, Dried blood, Green food.	Rice meal, Chop, Milk, Green food.
Nutritive ratio of ration		1 : 3·8	1 : 5·4
Number of pigs in pen		4	4
Average age at beginning of period	Days	84	96
Total weight at beginning of period	Lb.	160	234
Total live weight at end of period	"	191	230
Average daily gain per pig	"	·07	·00
Duration of feeding period	Days	105	105
Food consumed for 100 pounds gain:			
Rice meal	Lb.	722·58	....
Chop	"	722·58	....
Dried blood	"	290·32	....
Green food	"	3,387·09	....

In lots 17 and 18, wheat shorts were substituted for chop. In lot 18, where dried blood was substituted for milk, the gain was practically nil. In both 17 and 18 the

pigs became diseased, but in the former, where skim-milk was used they made gains in spite of this. The combination of rice meal and dried blood was far more unprofitable than that of rice meal and milk. The experience of last year's work proved the same (lots 3, 7, 9, and 13; report for 1913-14).

SUMMARY—Lots 17 and 18.

		Lot 17.	Lot 18.
		Pen 26.	Pen 28.
Ration.		Rice meal, Wheat Shorts Milk, Green food.	Rice meal, Wheat Shorts, Dried blood Green food.
Nutritive ratio of ration		1 : 4·9	1 : 3·4
Number of pigs in pen		4	4
Average age at beginning of period	Days	96	84
Total weight at beginning of period	Lb.	250	155
Total live weight at end of period	"	439	161
Average daily gain per pig during period	"	·36	·03
Duration of feeding period	Days	105	105
Food consumed for 100 pounds gain:			
Rice meal	Lb.	150·79	2,766·6
Wheat shorts	"	150·79	2,766·6
Milk	"	687·83	....
Dried blood	"	....	1,133·3
Green food	"	687·83	17,500·

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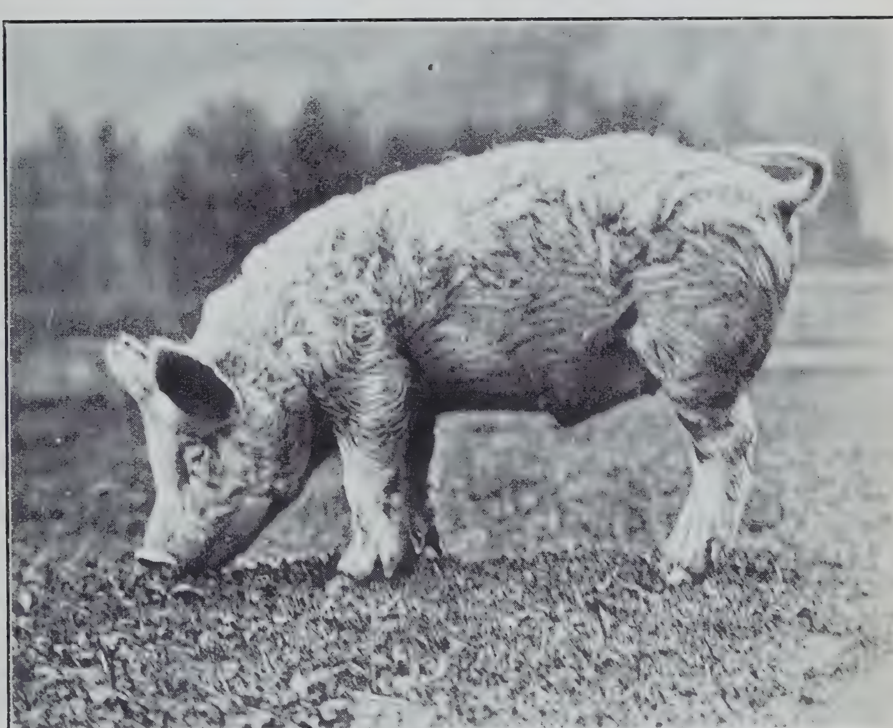
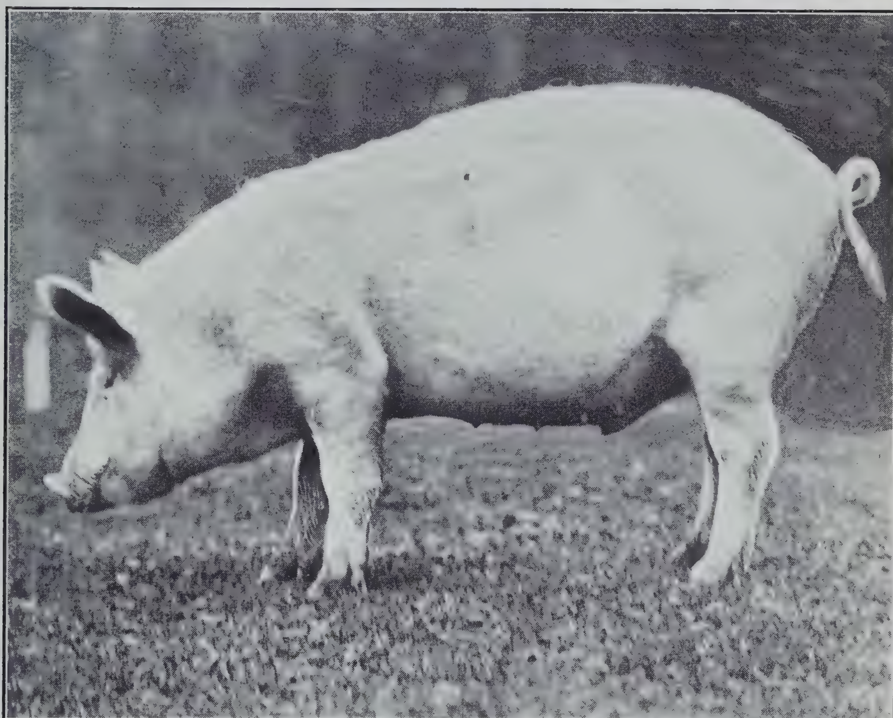
Brood sows and Cabins in which they wintered. Experimental Station, Lacombe.

16—1916—35a.

Agassiz, B.C. Young Sows wintered in Cots in the Bush. Note general condition after having been fed on clover ensilage and one third their usual grain ration for several weeks.



Agassiz, B.C. Pig 1, Pen 46. Fed rice meal, mangels, dry blood, and skim milk.



Agassiz, B.C. Pig 1, Pen 47. Fed rice meal, dried blood, skim milk and ground phosphate rock.

These pigs were litter mates and pig 1, pen 46, was the better pig of the two at the beginning of the feeding period. Pictures were taken before end of period. This illustrates the general effect of phosphorus on the rice meal ration.

In the next trial, where rice meal and wheat shorts were compared, in combination with dried blood and green food, lot 19, receiving wheat shorts, made average gains and remained perfectly healthy; lot 20, receiving rice meal, made some gains but became badly diseased.

SUMMARY—Lots 19 and 20.

		Lot 19.	Lot 20.
		Pen 30.	Pen 31.
Ration.		Wheat shorts, Dried blood, Green food.	Rice meal, Dried blood, Green food.
Nutritive ratio of ration		1 : 3·15	1 : 4·5
Number of pigs in pen		4	4
Average age at beginning of period	Days	97	97
Total weight at beginning of period	Lb.	177	182
Total weight at end of period	"	587	417
Average daily gain per pig	"	·78	·45
Duration of feeding period	Days	130	130
Food consumed for 100 pounds gain:			
Wheat shorts	Lb.	320·24	....
Rice meal	"	....	387·66
Dried blood	"	31·707	55·31
Green food	"	317·073	553·19
Cost to produce 100 pounds gain	$	4.80	6.86
Weights of viscera:			
Hearts and lungs	Lb.	8·7	8·2
Livers	"	12·5	8·0
Remainder	"	83·9	66·7
Total	"	105·1	82·9

Of the six lots reported on, five were fed rice meal in different proportions. Two lots became so diseased that they were worthless. Three made slight gains, though they all became diseased, and the cost of gain was such as to put profit out of the question. The sixth, fed wheat shorts, made normal gains at a normal cost, and remained perfectly healthy throughout. These results coincide with the work reported on last year.

With these facts in view, a series of ten trials, involving twenty-four lots or one hundred and thirty pigs, was carried out during the year. The main objects were to discover:—

1. The effect of feeding inorganic phosphorus with the various rations containing rice-meal.
2. The best form of inorganic phosphorus to feed.
3. The amount required to overcome the ill effects of rice-meal.

Description of hogs used.—The hogs used for this year's work were of much better grade than those used last year. Most of them were pure-bred Yorkshires, taken from litters raised on the Experimental Farm. They were selected with the object of having age, weight, and condition as nearly uniform as possible throughout

the entire trial; though, with the large number of pigs involved through the year, there was necessarily some variation. As a rule the pigs weighed about 50 pounds at the beginning of the feeding period. It was our aim to have feeding periods last one hundred days.

Housing and Management.—The pigs were fed indoors in a building, which, although rough, was well lighted and ventilated. The pens were cleaned out every day, and fresh straw bedding put down. The pigs were fed three times a day and were kept well supplied with water; a feed of soft coal to take the place of charcoal was given twice a week. They were regularly inspected by Dr. S. Hadwen, who also examined the pigs when slaughtered.

Complementary Foods.—The principal form of phosphorus used was that contained in ground phosphate rock. Basic slag, precipitated calcium phosphate, and a mixture of the first two, were also fed. Working on the principle that potash and wood ashes are good for hogs, certain small lots were given muriate of potash, and others were fed a mixture of ground phosphate rock, basic slag, and muriate of potash, to which we shall refer hereafter as mineral mixture. We might state here that the addition of muriate of potash gave negative results in every case. With regard to amounts, the pigs received approximately 20 grams a day of the crude material throughout the trials. This amount was mixed with the grain ration once a day. The addition of these minerals did not appear to change the palatability of the foods, judging by the behaviour of the pigs.

Following are the protocols of our experiments with phosphorus, fed in conjunction with rice meal in various rations, and some of the control pens.

We give a short discussion of each experiment, to which is appended the protocol in detail:—

TRIAL 1, LOTS 21A., 21B., 22.

THE EFFECT OF GROUND PHOSPHATE ROCK AS A COMPLEMENTARY FOOD TO RICE MEAL. CONTROL FED WHEAT SHORTS.

All three lots were fed dried blood, skim-milk, and green food. Lot 21A, fed rice meal, although making a daily gain of ·31 pound per pig, at a cost of $9.45 per 100 pounds, became diseased and totally disabled. Lot 21B, which received ground phosphate rock with the rice meal, made an average daily gain of ·775 pound, at a cost of $5.28 per 100 pounds, while lot 22, fed wheat shorts, gained ·93 pound daily, at a cost of $5.09 per 100 pounds. Here the combination of ground phosphate rock with rice meal entirely prevented the disease in the hogs, and the production compared favourably with wheat shorts; this was the first case in our experience where rice meal as a total grain ration failed to produce disease. Lot 21B made normal gains at a normal cost, and remained healthy; while lot 21A made low gains, at high cost and became diseased.

SUMMARY—Lots 21A, 21B and 22.

	Lot 21A.	Lot 21B.	Lot 22.
	Pen 33.	Pen 47.	Pen 32.
Ration.	Rice meal, Dried blood, Milk, Green food,	Rice meal, Dried blood, Milk, Green food, Ground phosphate rock.	Wheat shorts, Dried blood, Milk, Green food.
Nutritive ratio of ration	1 : 3·9	1 : 6·40	1 : 3·03
Number of pigs in pen	4	4	4
Average age of pigs at beginning of period.... Days	75	118	72
Total weight at beginning of period.... Lb.	149	294	145
Total weight at end of period.... "	310	604	632
Average daily gain per pig.... "	·31	·775	·93
Duration of period.... Days	130	100	130
Food consumed for 100 pounds gain:			
Rice meal.... Lb.	390·06	328·06	.....
Wheat shorts.... "	.....	.....	269·61
Dried blood.... "	62·11	14·51	26·69
Milk.... "	807·45	177·4	266·94
Green food.... "	807·45	322·6	266·94
Ground phosphate rock.... Grs.	.....	2,580	.....
Cost to produce 100 pounds gain.... $	9.45	5.28	5.09
Weights of viscera:			
Hearts and lungs.... Lb.	4·3	9·7	10·
Livers.... "	4·8	10·1	11·8
Remainder.... "	40·4	64·2	83·5
Totals.... "	49·5	84·	105·3

Trial 2, Lots 23 and 24.

THE EFFECT OF PHOSPHORUS IN A RATION CONTAINING ONE-THIRD RICE MEAL.

This was the first trial where rice meal was fed in as small a proportion as one-third of the ration. As will be seen from the protocols, both lots made reasonable gains at a reasonable cost, though lot 24, which received phosphorus, proved the more profitable. In the matter of condition, however, the difference was more marked. The pigs in lot 23 became diseased within periods varying from fifty-eight to seventy days. One pig died at thirty-eight days; although this was diseased, we cannot say that rice meal caused its death. With rice meal in this proportion with shorts, the disease is undoubtedly delayed, but as certainly makes its appearance. Lot 24, fed exactly the same ration, with the addition of ground phosphate rock, remained perfectly healthy throughout.

Summary—Lots 23 and 24.

		Lot 23.		Lot 24.	
		Pen 52.	Pen 35.	Pen 36.	Pen 53.
Ration.		Rice meal, Wheat shorts, Milk, Dried blood Green food.	Rice meal, Wheat shorts, Milk, Dried blood, Green food.	Rice meal, Wheat shorts, Milk, Dried blood, Green food, Ground phosphate rock.	Rice meal, Wheat shorts, Milk, Dried blood, Green food. Mineral mixture.
Nutritive ratio of ration		1 : 4·28	1 : 4·04	1 : 4·29	1 : 4·28
Number of pigs in pen		4	4	4	4
Average age of pigs at beginning of period	Days	120	95	95	122
Total weight at beginning of period	Lb.	260	232	278	250
Total weight at end of period	"	532	443	515	612
Average daily gain per pig	"	·68	·837	·705	·905
Duration of period	"	100	84	84	100
Food consumed for 100 pounds gain:					
Rice meal	Lb.	133·46	107·05	126·875	100·28
Wheat shorts	"	266·91	214·22	253·765	200·56
Milk	"	202·22	226·095	164·31	151·93
Dried blood	"	16·54	22·60	16·428	12·43
Green food	"	347·42	452·19	359·46	261·05
Ground phosphate rock	Grs.	....	....	2,913·155	....
Mineral mixture	$	....	....	....	3314·9
Cost to produce 100 pounds gain	$	6.37	5.76	6.14	4.99
Weights of viscera:					
Hearts and lungs	Lb.	10·9	8·0	8·10	8·9
Livers	"	9·9	8·7	8·7	10·5
Remainder	"	61·1	57·9	65·6	67·8
Totals	"	81·9	74·6	82·40	87·2

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Trial 3, Lots 25 and 26.

A COMPARISON OF WHEAT SHORTS AND RICE MEAL, BOTH COMBINED WITH GROUND PHOSPHATE ROCK.

In this trial, rice meal constituted the complete grain ration in lot 25, and wheat shorts in lot 26, and an equal quantity of ground phosphate rock was supplied in each case. It will be noted that the pigs fed rice meal made slightly larger daily gains, but were a little more costly than those fed wheat shorts. However, the pigs in lot 25 were a little heavier than those in 26 at the beginning of the period, although they were from the same litters. During the period all the pigs in the trial remained healthy, with the exception of one in lot 25 (rice meal), which became stiff in the hind-legs and refused food, but recovered in twenty-four hours. This occurred fifty-two days from the commencement of the feeding period, which is usually the critical time. It was the most rapid and permanent recovery observed in any rice meal fed hog. These results show rice meal, when combined with phosphorus, almost equal to wheat shorts, combined with the same element. However, the performance of lot 26 showed no advantage over other pens where wheat shorts were fed without phosphorus; which indicates that the addition of phosphorus to wheat shorts was of no particular benefit. This also goes to show that an excess of phosphorus beyond the needs of the body, though of no apparent benefit, produces no ill effects.

Summary—Lots 25 and 26.

		Lot 25.	Lot 26.
		Pen 37.	Pen 38.
		Rice meal, Milk, Dried blood, Green food, Ground phosphate rock.	Wheat shorts Milk, Dried blood Green food, Ground phosphate rock.
Nutritive ratio of ration		1 : 6·17	1 : 3·58
Number of pigs in pen		4	4
Average age of pigs at beginning of period	Days	95	95
Total weight at beginning of period	Lb.	533	510
Average daily gain per pig	"	·782	·732
Duration of feeding period	Days	84	84
Amount of food consumed for 100 pounds gain:			
Rice meal	Lb.	350·5	....
Wheat shorts	"		356
Milk	"	171	165
Dried blood	"	17·10	16·5
Green food	"	343	330·5
Ground phosphate rock	Grs.	2,740·5	2,647·5
Cost to produce 100 pounds gain	$	5·66	5.61
Weights of viscera:			
Hearts and lungs	Lb.	9·1	9·0
Livers	"	9·9	10·4
Remainder	"	60·80	66·10
Totals	"	79·8	85·5

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Trial 4, Lots 27 and 28.

A COMPARISON OF WHEAT SHORTS AND RICE MEAL, COMBINED WITH A LIMITED QUANTITY OF CALCIUM PHOSPHATE.

As in trial 3, rice meal and wheat shorts constituted the total grain ration: with each, 3 grams of precipitated calcium phosphate was supplied to each pig per day instead of 20 grams of the phosphate rock. In lot 28 (wheat shorts), the pigs made reasonable gains at a cost of $5.97 per 100 pounds and remained healthy throughout. In lot 27 (rice meal), the pigs made about half the daily gain of lot 28: the cost of production was $7.41 per 100 pounds. Twenty-five days from the beginning of the period two pigs showed the disease, and later the other two showed the same symptoms, which gradually became worse till the fortieth day, when all four showed well-marked evidence of the disease. On this date the quantity of phosphorus was doubled, and the effect was almost immediately noticed. By the forty-eighth day the pigs had practically recovered and remained apparently healthy until the seventy-ninth day, when the symptoms reappeared and gradually became worse, until, at the end of the period, the pigs showed all the typical symptoms of the disease, although not to an extreme degree. This leads us to believe that the amount of phosphorus supplied with the rice meal ration was not sufficient for the needs of the animal body, since when the quantity was doubled the symptoms disappeared for a time but reappeared towards the end of the period.

As in the case of lot 26 in trial 3, the calcium phosphate did not appear to have any effect, beneficial or otherwise, upon wheat shorts as a food.

Summary—Lots 27 and 28.

		Lot 27.	Lot 28.
		Pen 44.	Pen 45.
Ration.		Rice meal, milk, dried blood, green food, calcium phosphate.	Wheat shorts, milk, dried blood, green food, calcium phosphate.
Nutritive ratio of ration		1 : 5·6	1 : 3·58
Number of pigs in pen		4	4
Average age of pigs at beginning of period	days	114	101
Total weight at beginning of period	lb.	275	247
Total weight at end of period	"	462	554
Average daily gain per pig	"	445	·73
Duration of period	days	105	105
Amount of food consumed for 100 pounds gain:			
Rice meal	lb.	431·55	....
Wheat shorts	"	....	370·68
Milk	"	275·40	167·75
Dried blood	"	27·54	16·775
Green food	"	550·8	335·5
Calcium phosphate	grs.	1,043·48	635·34
Cost to produce 100 pounds gain	$	7.41	5.97
Weights of viscera:			
Hearts and lungs	lb.	8·1	10·
Livers	"	7·8	9·4
Remainder	"	53·4	64·8
Total	"	69·3	84·2

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TRIAL 5, LOTS 29 AND 30.

THE EFFECT OF GROUND PHOSPHATE ROCK IN A RATION OF RICE MEAL ONE-THIRD, AND BARLEY TWO-THIRDS.

The combination of rice meal and barley appeared to be an unprofitable one, even when complemented with ground phosphate rock. However, lot 30, receiving the phosphate, made larger and more economical gains than lot 29. They were also in better condition throughout the entire trial, although, seventy-seven days after feeding commenced, their skins became discoloured and they had a generally unthrifty appearance, though showing no actual symptoms of the disease. In contrast to this, lot 29 showed the first symptoms at thirty-seven days, and they were all stiff before the forty-sixth day. They continued to get worse till the end of the period; one pig died before the end of the trial.

SUMMARY—Lots 29 and 30.

Ration.		Lot 29.	Lot 30.
		Pen 40.	Pen 41.
		Rice meal, barley, dried blood, milk, green food.	Rice meal, Barley, dried blood, milk, green food, ground phosphate rock.
Nutritive ratio of ration		1 : 5·	1 : 5·81
Number of pigs in pen		4	4
Average age of pigs at beginning of period	days.	116	116
Total weight at beginning of feeding period	lb.	225	327
Total weight at end of period	"	376	542
Average daily gain per pig	"	·689	·73
Duration of period	days.	73	73
Amount of food consumed for 100 pounds gain:			
Rice meal	lb.	290·325	122·
Barley	"	581·285	244·
Dried blood	"	74·54	15·95
Milk	"	745·41	159·5
Green food	"	1,490·82	319·5
Ground phosphate rock	grs.	....	2,559·5
Weights of viscera:			
Hearts and lungs	lb.	5·4	8·9
Livers	"	6·7	8·8
Remainder	"	31·4	56·1
Totals	"	43·5	73·8

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Trial 6, Lots 31 and 32.

THE EFFECT OF GROUND PHOSPHATE ROCK IN A RATION OF RICE MEAL, BARLEY, AND WHEAT SHORTS (EQUAL PARTS).

In this trial, lot 32 contained twice as many pigs as lot 31. With regard to gains, lot 32, receiving phosphate, gave a larger average daily gain at a cheaper price than lot 31. Each lot contained one very poor, blind grade Berkshire barrow. Of these two the one receiving the phosphate died, whereas the other, though badly diseased, remained alive to the end of the feeding period. We cannot blame the feeding for the condition of either pig as it is extremely doubtful if, under the best conditions, these pigs would have been profitable.

In lot 32, fed on phosphate, all the pigs with the one exception just mentioned, grew well and were in excellent condition when slaughtered; whereas in lot 31, forty-eight days from the beginning the pigs showed typical symptoms, which gradually got worse up to the end of the trial.

Summary—Lots 31 and 32.

Ration.		Lot 31.	Lot 32.	
		Pen 42.	Pen 43.	Pen 55.
		Rice meal, barley, wheat shorts, dried blood, milk, green food.	Rice meal, barley. wheat shorts, dried blood, milk, green food, ground phosphate rock.	Rice meal, barley, wheat shorts, dried blood, milk, green food, ground phosphate rock.
Nutritive ratio of ration		1 : 4·97	1 : 5·01	1 : 5·03
Number of pigs in pen		4	4	4
Average age of pigs at beginning of period	days.	130	116	120
Total weight at beginning of period	lb.	288	293	254
Total weight at end of period	"	485	502	577
Average daily gain per pig	"	·674	·715	·807
Duration of feeding period	days.	73	73	100
Food consumed for 100 pounds gain:				
Rice meal	lb.	139·	125·	112·38
Barley	"	139·	125·	112·38
Wheat shorts	"	139·	125·	112·38
Dried blood	"	18·75	16·45	13·93
Milk	"	187·5	164·5	170·28
Green food	"	375·	329·	292·57
Ground phosphate rock	grs.	....	1,345·2	3,715·17
Cost to produce 100 pounds gain	$	7·98	7·38	6·33
Weights of viscera:				
Hearts and lungs	lb.	9·0	7·5	10·4
Livers	"	9·2	8·5	10·1
Remainder	"	54·1	54·7	59·5
Totals	"	72·3	70·7	80·

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Trial 7, Lots 33 and 34.

EFFECT OF BASIC SLAG IN A RATION CONTAINING RICE MEAL, BARLEY, AND SHORTS, (EQUAL PARTS).

In this trial it was impossible to get pigs of a comparable weight and age. Lot 33, which did not receive any phosphorus, was given a decided advantage in having older, stronger, and better-conditioned pigs. However, in spite of this advantage, after sixty days the characteristic lameness appeared. Lot 34, receiving the phosphate in the form of basic slag, made a smaller average daily gain, though at a cheaper rate per 100 pounds. This was to be expected with younger animals; however, with the addition of the basic slag they withstood the rice meal feeding better, and remained in good condition throughout the trial.

Summary—Lots 33 and 34.

Ration.		Lot 33.	Lot 34.
		Pen 54.	Pen 56.
		Rice meal, barley, wheat shorts, milk, dried blood, green food.	Rice meal, barley, wheat shorts, milk, dried blood, green food. basic slag.
Nutritive ratio of ration		1 : 5·51	1 : 5·03
Number of pigs in pen		4	4
Average age of pigs at beginning of period	days.	168	101
Total weight at beginning of feeding period	lb.	495	229
Total weight at end of period	"	906	532
Average daily gain per pig	"	·822	·795
Duration of feeding period	days.	100	100
Food consumed for 100 pounds gain:			
Rice meal	lb.	136·25	114·15
Barley	"	136·25	114·15
Wheat shorts	"	136·25	114·15
Milk	"	133·82	172·95
Dried blood	"	10·95	14·15
Green food	"	230·	297·17
Basic slag	grs.	....	3,930·81
Cost to produce 100 pounds gain	$	7·02	6·43
Weights of viscera:			
Hearts and lungs	lb.	12·7	10·7
Livers	"	13·4	9·0
Remainder	"	89·8	58·4
Totals	"	115·9	78·1

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Trial 8, Lots 35 and 36.

EFFECT OF MINERAL MIXTURE IN RATION OF RICE MEAL.

The mineral mixture supplied consisted of: ground phosphate rock, three parts; basic slag, three parts; and muriate of potash, one part, by weight.

Of this the pigs in lot 36 were fed 30 grams per day per pig. Lot 35, fed on rice meal without mineral, was composed of younger and heavier animals, having a decided advantage in every respect. In spite of this, lot 36 gave larger daily gains at a much cheaper rate per pound, and remained perfectly healthy, and the quality of the pork after killing was decidedly superior. In lot 35, fifty-nine days from the beginning, the pigs began to stiffen in the hind legs: they showed loss of appetite, and their hair and skin became very rough; their eyes had the usual staring expression. At the end of eighty-six days the pigs showed every symptom of straight rice-meal feeding. In lot 36, each pig received about 6 grams more phosphorus-bearing material than any pig in the preceding trials. It is worthy of note that this lot (36) was one of the most profitable in the whole series; and, also, that lot 35, with which it is compared, was one of the best rice-meal lots which we have fed.

Summary—Lots 35 and 36.

		Lot 35.	Lot 36.
		Pen 46.	Pen 51.
Ration.		Rice meal, dried blood milk, green food.	Rice meal, dried blood milk, green food, mineral mixture.
Nutritive ratio of ration		1:6·31	1: 6·54
Number of pigs in pen		4	4
Average age of pigs at beginning of period	days.	114	122
Total weight at beginning of period	lb.	296	255
Total weight at end of period	"	512	612
Average daily gain per pig	"	·54	·892
Duration of feeding period	days.	100	100
Food consumed for 100 pounds gain:			
Rice meal	lb.	450·46	305
Dried blood	"	20·83	12·60
Milk	"	254·63	154·06
Green food	"	463·42	264·7
Mineral mixture	grs	....	3,361
Cost to produce 100 pounds gain	$	7·26	4·94
Weights of viscera:			
Hearts and lungs	lb.	8·1	9·3
Livers	"	7·0	10·9
Remainder	"	47·3	73·3
Totals		62·4	93·5

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Trial 9, Lots 37 and 38.

EFFECT OF GROUND PHOSPHATE ROCK UPON RATION OF GROUND BARLEY.

It has been already noted that the mixture of rice-meal and barley gave the poorest returns of any rice-meal mixture. A trial was therefore made to see if barley would be improved by the addition of ground phosphate rock. As will be seen from the protocols, there was very slight difference in favour of the lot fed phosphate. It must be noted, however, that pig No. 1 in lot 37, fed no phosphate, became very suddenly lame and could not rise sixty-eight days from the beginning. At the time of slaughter it was found that both femora had been broken, and at that time were partly healed. This was decidedly to the disadvantage of lot 37.

Summary—Lots 37 and 38.

		Lot 37.	Lot 38.
		Pen 48.	Pen 49.
Ration.		Barley, dried blood milk, green food.	Barley, dried blood milk, green food ground phosphate rock.
Nutritive ratio of ration		1: 5·73	1: 5·86
Average age of pigs at beginning of period	days	118	118
Total weight at beginning	lb.	302	288
Total weight at end of period	"	639	681
Average daily gain per pig	"	·842	·982
Duration of feeding period	days	100	100
Food consumed for 100 pounds gain:			
Barley	lb.	338·87	318·32
Dried blood	"	13·06	11·45
Milk	"	163·2	139·94
Green food	"	296·73	254·2
Ground phosphate rock	grs.	....	2,035·6
Weights of viscera:			
Hearts and lungs	lb.	8·8	9·5
Livers	"	9·7	9·5
Remainder	"	60·1	59·4
Totals		78·6	78·4

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Trial 10, Lots 39, 40, 41 and 42.

A COMPARISON BETWEEN THE DIFFERENT FORMS OF PHOSPHORUS AND MINERALS USED WITH RICE MEAL.

This experiment was an attempt to determine the relative merits of ground phosphate rock, basic slag, muriate of potash, and the mineral mixture, as complementary foods in a ration containing rice meal. There were four lots in all. Of these, Nos. 39, 40, and 42, getting respectively ground phosphate rock, basic slag, and the mineral mixture, all made good average daily gains at a reasonably low cost. As will be seen from the protocols the results are slightly in favour of the ground phosphate rock. Lot 41 received muriate of potash, and made low daily gains at a very high cost. This would indicate that the muriate of potash has no power to counteract the ill-effects of rice meal. In the matter of general health and condition, the same may be said, since those receiving ground phosphate rock and basic slag went through the trial without showing any symptoms of the disease, while those receiving mineral mixture showed only slight symptoms on two different occasions, the seventy-seventh and the ninety-seventh days. On the other hand, the pigs receiving the potash developed symptoms at sixty-six days, which became acute, and by the end of the period they had to be helped to the trough.

Summary—Lots 39, 40, 41, and 42.

	Lot 39.	Lot 40.	Lot 41.	Lot 42.
	Pen 55.	Pen 56.	Pen 57.	Pen 58.
Ration.	Rice meal, barley, W. shorts, milk, dried blood green food, ground phosphate rock.	Rice meal, barley, W. shorts, milk, dried blood, green food, basic slag.	Rice meal, barley, W. shorts, milk, dried blood, green food, Muriate of potash.	Rice meal, barley, W. shorts, milk, dried blood, green food, mineral mixture.
Nutritive ratio of ration	1: 5·03	1: 5·03	1: 4·95	1: 5·08
Average age of pigs at beginning of period ...... days	120	101	77	77
Total weight at beginning of period ...... lb.	254	229	234	227
Total weight at end of period ...... "	577	532	389	496
Average daily gain per pig per day ...... "	·807	·795	·387	·269
Duration of feeding period ...... days	100	100	100	100
Food consumed for 100 pounds gain—				
Rice meal ...... lb.	112·38	114·15	169·03	167·83
Barley ...... "	112·38	114·15	169·03	107·83
Shorts (wheat) ...... "	112·38	114·15	169·03	107·83
Milk ...... "	170·28	172·95	550	550
Dried blood ...... "	13·93	14·15	29·03	16·72
Green food ...... "	292·57	297·17	335·5	236·06
Ground phosphate rock ...... grs.	3,715·17			
Basic slag ...... "	....	3,930·81	1,936	
Muriate of potash ...... "	....	....	....	4,461
Mineral mixture ...... "	....	....	....	....
Cost to produce 100 pounds gain ...... $	6·33	6·43	9·27	6·31
Weights of viscera—				
Hearts and lungs ...... lb.	10·4	10·7	7·3	9·4
Livers ...... "	10·1	9·0	6·9	9·2
Remainder ...... "	59·5	58·4	38·4	68·0
Totals ...... "	80·	781·	52·6	86·6

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SUMMARY OF RESULTS.

The results of the experiments show a distinct benefit from feeding inorganic phosphorus with rice-meal. In all, one hundred and twenty-nine pigs were put through the trials. Of these, forty-nine were fed rice-meal in various proportions with other grains; all these pigs developed the typical diseased condition previously noticed in rice-meal fed pigs. Phosphorus in different forms was given as a complementary food to the above ration with forty-eight hogs. With one exception these hogs remained perfectly healthy throughout the trials, and showed no ill-effects from the rice-meal. Calcium phosphate in smaller quantities fed to four pigs failed to counteract completely the injurious effects of a ration of rice-meal. Liberal quantities of muriate of potash were absolutely ineffective in the case of pigs fed on a ration containing rice-meal.

Finally, twenty-four control pigs, fed on rations not containing rice-meal, remained normal and healthy throughout.

CONCLUSIONS.

(1) The injurious effects of rice-meal, in proportions as low as one-third of the total grain ration, have received further confirmation.

(2) Inorganic phosphorous added to the ration containing rice-meal, is capable of counteracting these injurious effects.

(3) From the work done, ground phosphate rock appeared to give better results than the other forms used.

(4) More work is necessary in this connection; and consequently investigations are being made as to the different forms of inorganic phosphorus and the quantities necessary for the utilization of rice-meal as a food for fattening and breeding hogs.

ADDITIONAL NOTES ON PATHOLOGICAL LESIONS OF PIGS FED RICE MEAL.

By S. Hadwen, D.V.Sci., Veterinary Research Laboratory, Agassiz, B.C.

At Mr. Moore's request I am adding a short report on my post-mortem findings with pigs fed on rice meal.

The following notes are an amplification of the findings which appeared in last year's report. As before, all hogs were examined at the time of slaughter, and in certain of the pens, lesions were encountered similar to those reported last year.

In my first report I inclined to the theory that toxins were responsible for the lesions encountered. This idea has been, in my opinion, fully justified by subsequent examinations, though the primary cause of the disease is, without doubt, incomplete nutrition. Owing to this state of malnutrition, the alimentary tract does not function normally, and toxic products are absorbed into the system; these are caused either by the direct action of bacteria or by the fermentation of the ingesta.

A number of cases of primary hydropericardium were encountered. The effusion in most cases had dried up, leaving the pericardial sac firmly adherent to the heart. Evidently, during the feeding trials, there is more or less dropsy accompanied by a œdematous condition of the lungs. The effusion into the pericardium was invariably clear and limpid, denoting that it was not of secondary origin. According to Stengel, primary pericarditis occurs in association with acute rheumatism, septic infection, and nephritis, either acute or chronic.

LESIONS OF THE ALIMENTARY TRACT.

Lesions were found similar to those before described. It is well, however, to bear in mind that such lesions are somewhat hard to interpret. Nearly all the literature available, on the subject, is medical literature: the medical man here has a decided

advantage over the veterinarian, especialy in diagnosing symptoms of stomach troubles. In some cases there was undoubtedly dilatation of the stomach; this was noticed on post-mortem examination. It was very noticeable in one pen; the stomachs of these pigs were filled with food and distended with gas. The mucous membranes in this cast were not bile-stained, but were catarrhal; however, these four pigs grew well, having received phosphorus in addition to rice-meal. In striking contrast to this, the pigs in the other pen, fed no phosphorus, did not grow well, developed a neuritis, and lost the use of their limbs. When they were killed the four stomachs were found to be shrunken and hard, contained bits of straw and other refuse, were bile-stained throughout, and covered with a sticky, glairy mucus, as was also the duodenum. These two cases illustrate the difficulty of diagnosis. The first pen was profitable and, from a feeder's point of view, healthy, though the alimentary canal was not functioning normally; the second lot of pigs were distinctly unprofitable, looked unthrifty, and showed well-marked internal lesions.

According to Smith,[1] bile is very seldom found in a healthy stomach. In the course of our examinations we have encountered gastric ulcers. According to the above writer, "the lesions of the gastric mucous membrane, produced by bile in the presence of an excess of ·5 per cent of hydrochloric acid, consist of necrosis of the epithelium and interglandular tissue, with hemorrhages into the mucous membrane, as the result of which small superficial ulcers may form." He says that the presence of mucus assists in protecting the stomach. This is borne out by the observations made here. Intermediate stages have also been noticed.

The most marked external symptom is the extraordinary growth of hair in pigs fed on rice-meal. The hair grows long, coarse and dirty, with a tendency to curl (see figs. 1 and 2, Report of Superintendent). In these cases bone-formation proceeds irregularly, and the bones become very soft; but these lesions were fully described before. These symptoms are undoubtedly secondary and are due to malnutrition.

The experiments are being continued, and no doubt further opportunities for the study of this disease will be forthcoming. The work seems worthy of effort, not only from the feeder's standpoint but also from the scientific side; especially at this time, when great interest is being taken in nutrition diseases, especially beri-beri in man, which the condition described so closely resembles.

[1] An experimental study of the relation of bile to ulceration of the mucous membrane of the stomach. G. M. Smith, Jour. Med. Research, vol. xxx, No. 2, pp. 147-183.

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